MEDUSA WATERPROOFING

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MEDUSA
Waterproofing and Waterproofed Cements

For General Index,
see page 115

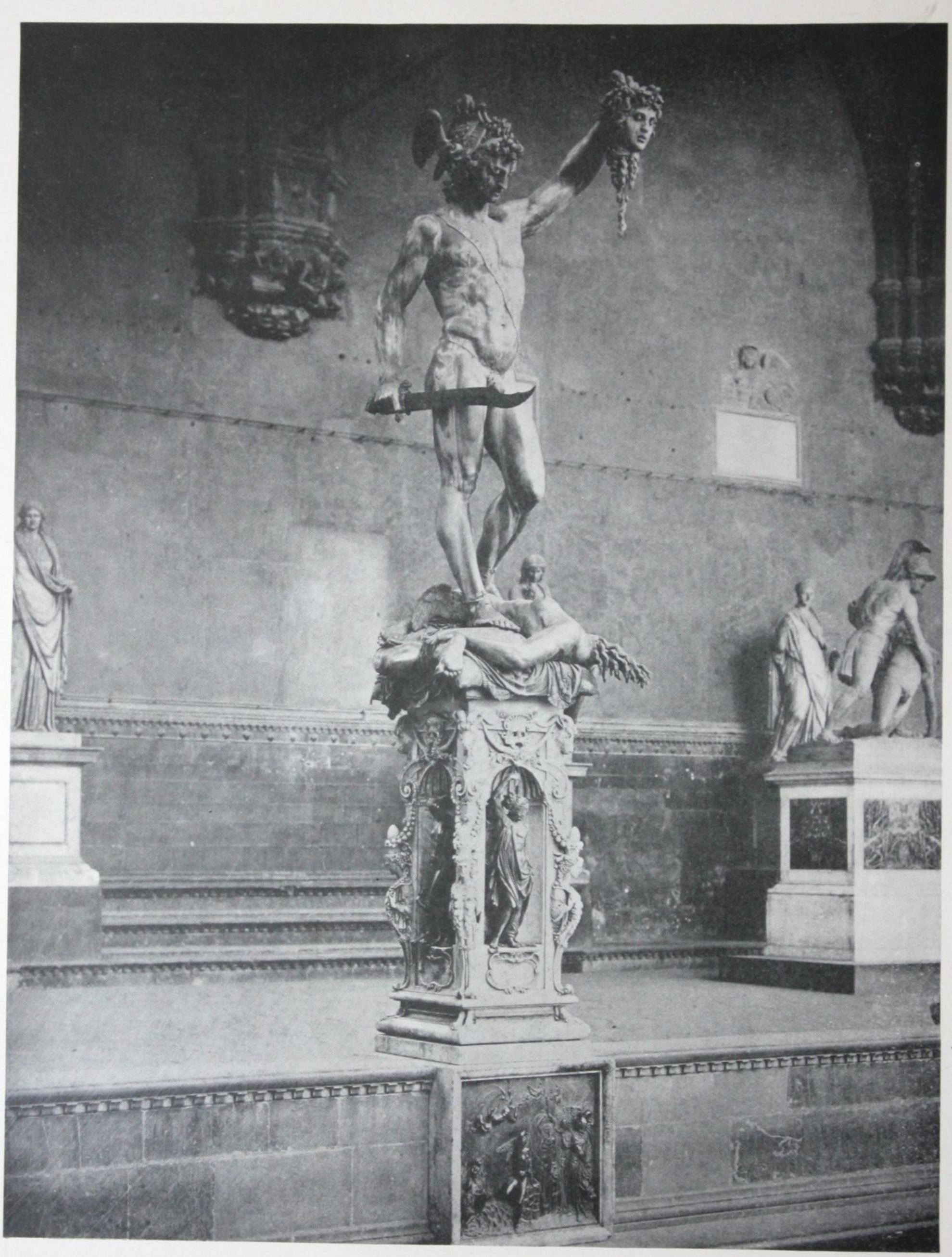
Medusa, the Standard of Integral Waterproofing Quality

THE SANDUSKY CEMENT COMPANY
Cleveland

Factories at: York, Pa.; Bay Bridge, Ohio; Toledo, Ohio; Dixon, Ill.

Manufacturers of Medusa Waterproofing (Powder or Paste); Medusa Stainless White Portland Cement (Plain or Waterproofed); Medusa Gray Portland Cement (Plain or Waterproofed) and Medusa Cement Paint

This edition supersedes all previous issues



Why Do We Use the Name "Medusa"?

Each of us has brought from his early school days some memory of the story that the teachers used to tell us in "the grades" —of Medusa, that monstrous woman-creature with a lovely face but with live serpents for hair; so fearful to behold that all who saw her were instantly turned into solid stone right where they stood!

If we are to believe Greek Mythology, therefore, it was Medusa who first possessed the power to turn things into solid stone. Portland cement was unknown in *her* day, but by 1893, when our Company was organized, the great and important place of that material had begun to be fully realized.

No stone formed under the ancient Medusa's terrible stare could be more lasting than that made with the *modern* Medusa; and so, at the very beginning of the present Company, that word was selected as a trade name to designate our various products.

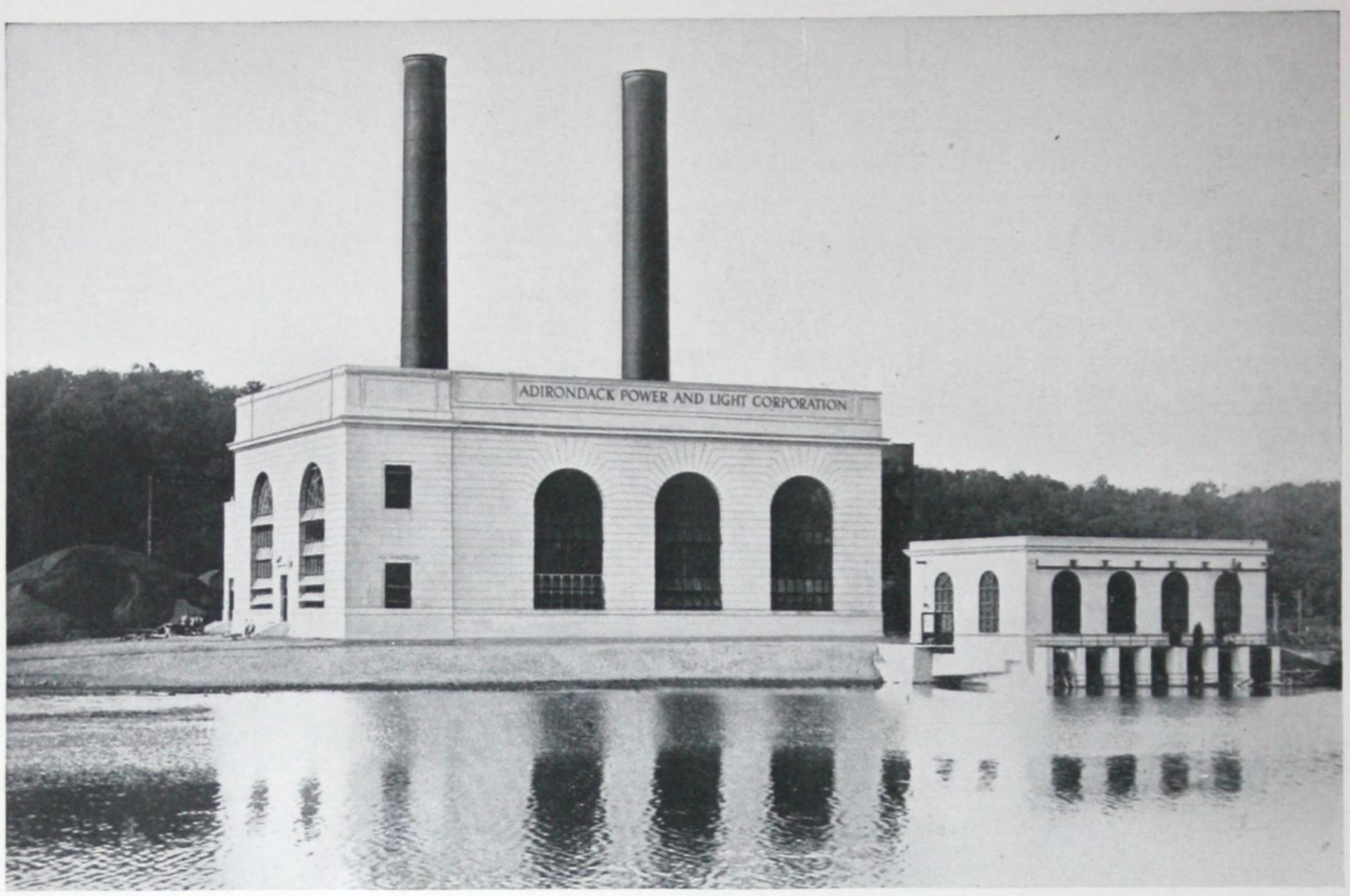
A reproduction of the Medusa Rondanini, a classical Greek sculpture now in Rome, cast in Medusa White Cement, has been used in this Company's advertising for many years.

Very briefly, this is the Legend of Medusa as it was told in a pamphlet issued by our Company several years ago:

> Medusa was one of the three Gorgons, a monstrous creature half woman, half vulture, with snaky locks, a look into whose face turned the beholder into stone.
>
> The hero Perseus, whom the wicked King Polydectes feared and wished to destroy, was commanded to bring the head of Medusa, and, provided by Athena and Hermes with winged sandals, a magic pouch, helmet of invisibility and a sword which could cut through anything, he cut off the Gorgon's head, using his shield as a mirror, so as not to be turned to stone by looking at her face.
>
> On his return journey he, by the power of Medusa's head, transformed the Giant Atlas into a mountain and liberated the maiden Andromeda by changing the sea monster that was about to devour her into a rocky reef.
>
> He also punished King Polydectes and his evil counsellors by showing them the Medusa head, the sight of which turned them into stone images.
>
> Medusa was the earliest maker of Artificial Stone and her likeness is therefore highly appropriate as our trade-mark.

This story passed by word of mouth from one small Grecian town to another. It was repeated at night around the camp fires of the Army of Alexander the Great. When the Persians were driven back across the Aegean Sea, their Greek prisoners carried the story into Asia. Thus it has wandered through the ages and has finally come down to our time.

A statue by Benvenuto Cellini, and now on permanent exhibition in the Loggia dei Lanzi at Florence, shows the artist's conception of Perseus holding aloft the freshly-severed head of Medusa. A picture of this statue is reproduced upon the opposite page.



Solid Walls of Medusa Waterproofed White Cement—Power House of Adirondack Power & Light Corp., Amsterdam, New York

MESSRS. McKim, Mead & White, New York, Architects. Turner Construction Company, New York, General Contractors. Guy Park Cement Company, Amsterdam, N. Y., Dealers.

One of the unique features of this structure is the fact that it is of monolithic reinforced concrete construction, built *throughout* with Medusa Waterproofed White Portland Cement. A total of 2,200 barrels was required.

As a glance at the photograph will show, the owner, architects and contractor were all interested in securing a work of beauty as well as utility. Reinforced concrete construction was desired, yet they wished to avoid the *appearance* of concrete if at all possible.

For several months, the Company and its advisors considered veneers of stone and brick; costs of other types of construction were also carefully analyzed. The walls were to range from 12 to 36 inches thick; provision had to be made for going through them at a later date, if necessary to add entry-ways, pipe lines or conduits, without risk of damage to the superstructure.

Monolithic reinforced concrete construction would permit this; and the use of Medusa Waterproofed White Cement would also allow for ornamental panel work in the forms, giving the effect of hand-cut stone trim around doors and windows.

And finally, since Medusa Waterproofed White Cement is non-absorbent, the structure could safely be expected to retain its original color indefinitely, remaining free from discoloration and efflorescence.

Specifications called for:

1 part Medusa Waterproofed White Portland Cement.

2½ parts clean, sharp, evenly-graded sand.

5 parts clean gravel.

The building has been finished since 1921. It remains a source of real satisfaction to owner, architect and contractor as representing a new, successful venture in reinforced concrete construction.

As this book goes to press, the Adirondack Power & Light Company is just getting under way with an extensive addition to the plant shown above—and of the same construction described here.

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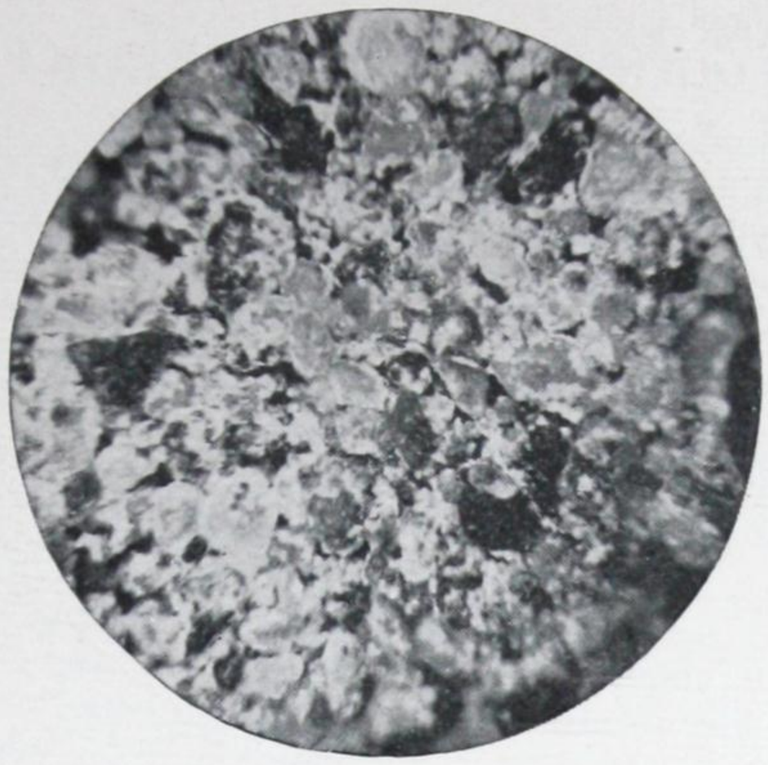
TA434
.S26
1920



Ordinary Concrete is Not Waterproof But Can Easily Be Made So

THE best concrete that can be made—meaning concrete containing a "rich" proportion of cement, thoroughly mixed with the aggregates and tamped or spaded to maximum density—contains from 20% to 40% of open spaces, or pores, or "voids."

These voids constitute the areas occupied by water when the concrete was first poured; as the water dries away, they are of course left.

A glance at the illustration above will make this point clear. This picture was made from a photo-enlargement of a section of concrete, magnified 42 diameters. The light spots are cement, sand and gravel; the dark portions are the open spaces, or voids.

The Voids in Plain Concrete Absorb Water by Capillary Attraction

Whenever ordinary concrete—that is to say, concrete made of plain Portland cement, aggregates, and water—is exposed to dampness, the concrete immediately begins to absorb moisture by capillary attraction.

This holds true, whether the concrete be in foundation walls and floors exposed to ordinary ground moisture; or whether the building stands close beside a river or other body of water; or whether the material be in stucco above the ground line, exposed to rain or snow.

The amounts of water absorbed may differ according to location; but ordinary plain concrete *will take up water*, at any time, anywhere.

The Cause of Water Absorption

The force against which we have to contend in order to reduce water-absorption of concrete is the Capillary Attraction exerted by the minute pores or tubes. A simple demonstration of this force may be observed by dipping the corner of a piece of blotting paper in water. The water will be drawn up in the sheet despite the force of gravity. On many operations this force of capillary attraction is accompanied, and the tendency to absorb water or permit its penetration is increased, by Hydrostatic Pressure.

The force used to overcome the Capillary Attraction and Hydrostatic Pressure is Surface Tension.

Medusa Waterproofing Will Keep Water Out of Concrete Forever

Study of the best methods of making mass concrete impervious to dampness, together with exhaustive laboratory tests covering a period of many years, finally led the late Dr. S. B. Newberry, founder of The Sandusky Cement Company, to the development of *Medusa Waterproofing*.

This product represents the first practical means of making concrete *moisture-repellent throughout the mass*. It has been manufactured by our Company on a large commercial scale for more than eighteen years, and its use on all types of concrete construction, under almost every imaginable condition, has marked the record of one notable success after another.

Medusa Waterproofing was the first integral waterproofing material to be placed upon the market. It was a *commercial* success when Architects, Engineers and Contracting Firms, the country over, first began to specify and use it. It has proved a *permanent* success, in that many of the concrete jobs in which it was first used, eighteen or more years ago, are giving excellent service today—the water-repellent qualities of the concrete still unimpaired.

Medusa Waterproofing Comes in Four Convenient Forms

Medusa Waterproofing Powder is white, finely ground and highly water-repellent. When mixed with any reliable brand of plain Portland cement, in proper proportions, it is uniformly distributed through the concrete, being entrapped or held in place by the cement, sand and aggregate. Due to its water-repellent nature, it prevents the absorption or percolation of rain-water, ground or drainage water, spring-water, or dampness or moisture from the earth or atmosphere.

For every bag of Portland cement you use, mix 2 per cent, or two pounds, of Medusa Waterproofing if you want absolutely waterproof concrete.

Medusa Waterproofing Powder is furnished in 40-lb. cloth sacks, enough to mix with, and thoroughly waterproof, 20 bags of Portland cement.

Medusa Waterproofing Paste is quite similar to the Powder in composition. Its effect on the concrete mass is exactly the same as that of Medusa Waterproofing Powder. It is a heavy paste, to be dissolved in the gauging water while concrete is being mixed.

Two per cent of Medusa Waterproofing by weight of the cement, or two pounds per sack, is the correct proportion to render concrete permanently waterproof.

Medusa Waterproofing Paste comes in cans, with large friction seal tops, of 1 gallon (8 lbs.) and 5 gallons (40 lbs.) each. These are packed for shipment in substantial crates of 6 one-gallon or 2 five-gallon cans each. A quart of Medusa Waterproofing Powder weighs one pound. A pint of Medusa Waterproofing Paste weighs one pound.

Medusa Waterproofed Gray (Portland) Cement. This is our regular Portland cement, made according to the exacting standards of the American Society for Testing Materials, to which Medusa Waterproofing is added in exactly the right proportions during the proces of manufacture, and thoroughly ground in.

Customers are respectfully advised to specify and use *Medusa Waterproofed Gray Cement* wherever possible, as the process of its manufacture assures, first, the correct proportion of Waterproofing and Cement, and second, the thorough mixing of the two while the clinker is ground.

Medusa Waterproofed White Portland Cement. This is our standard White (Non-Staining) Portland Cement, used for stucco construction; non-staining mortar for marble, terra cotta, brick, etc.; lawn and garden furniture; building trim; and many other uses.

The addition of Medusa Waterproofing to the White Cement as explained above, while the clinker is being ground, assures thorough mixing and the correct proportions of both Waterproofing and White Cement in each batch.

Waterproofed White Cement walls will absolutely keep dampness out of the interiors of stucco houses. Stucco will not remain dark or discolored after heavy rains; and it is much easier to keep clean where the surface is exposed to soot or grime, since the waterproofing has the tendency to keep dirt out of the texture of the stucco.

"Waterproofed White Means Medusa." There is no other waterproofed white cement except *Medusa* Waterproofed White Cement. This is exclusively a product of The Sandusky Cement Company.

Waterproofed Cements at a Saving

Medusa Waterproofed Cement costs less to buy, already mixed than would the Waterproofing and Cement separately. Medusa Waterproofed Cements may be stored indefinitely without caking due to moisture. They will even withstand considerable direct exposure to dampness without becoming "set" in the bag or barrel.

"Medusa" Products are sold through established reputable dealers in building materials, etc. We shall be pleased to refer retail inquiries to a convenient source of supply and to quote prices and furnish particulars to dealers, upon request.

The illustrations in this Book show the great variety of ways in which Medusa Waterproofing may be applied successfully.

In some cases, Medusa Waterproofing, Powder or Paste, has been used in connection with other brands of Portland cement; in others, Medusa Waterproofed Gray Portland Cement has been employed throughout the job; and in still others, Medusa Waterproofed White Portland Cement has been the chosen element.

This diversity of material and of method, emphasizes the fact that Medusa Waterproofing is available in many convenient forms, according to the customer's location and particular needs.

Its value is the same in every case, however, so long as the general principles given in the following pages are followed.

There are Four Main Systems of Waterproofing

Since the earliest days of the manufacture of Portland cement in this country, the need for preventing the absorption of water by concrete has been fully recognized.

Methods:—There exist four main methods of rendering concrete waterproof, damp-proof, and impermeable, as follows:

a—The Integral Method of Waterproofing of Concrete or the uniform distribution thruout the concrete of an *insoluble* water-repellent substance in sufficient quantity to render the entire mass permanently impervious to water, with no detriment to the concrete.

b—The waterproof Cement Plaster Coat method or the application of a layer of from ¾″ to 1″ of a waterproof cement mortar or plaster composed of Portland cement, sand and waterproofing.

c—The Membrane Method, consisting of the application of successive coats of asphaltic or bituminous material, heated in order to render it plastic, with the interposition of successive layers of felt or paper.

d—The application of a paint to the surface, on the outside below grade.

Integral Waterproofing

The problem which presents itself is: some means of rendering the mass or body of the concrete waterproof and damp-proof, so that water will be unable to pass from outside the structure to the interior, and so impervious that the amount of water entering the surface pores of the concrete will be reduced to a minimum.

While it may seem possible to obtain waterproof concrete in a commercial operation by rich cement mixtures, extra thick walls, careful proportioning and extra care in mixing, the results obtained in a large number of operations indicate that it is not commercially practicable to secure waterproof effects without the addition to the mixture of a suitable material, which will cause the concrete when it has hardened to become waterproof, damp-proof, impervious and non-absorbent.

As we have pointed out, ordinary concrete, as commercially placed, contains approximately 20% voids. If it were possible to fill all of these voids with a substance which would not absorb water and which would not decrease the strength of the concrete, the problem would be simple of solution.

The addition of a number of finely divided fillers has been tried with unsatisfactory results. It has been found that the addition of hydrated lime does to some extent fill the voids or increase the density, as is evidenced by the fact that a moderate percentage of it can be added to concrete mixtures without any considerable increasé in the volume of the concrete.

But it must be remembered that hydrated lime is a water-*absorbent* material and that its setting, hardening or binding properties are so slight as to be negligible when contrasted with Portland cement.

Tests extending over long periods of time by the Structural Materials Laboratory of the Lewis Institute, Chicago, under the direction of Prof. Duff A. Abrams indicate quite conclusively that the addition to concrete mixtures of even very small amounts of hydrated lime results in decreased strength of the concrete. Where plasticity is more important than great strength, as in mortar for brick and stone, the addition of not more than 10% of hydrated lime by weight of the cement used will prove valuable.

The Waterproofed Cement Plaster Coat Method

This is the most permanent and inexpensive method of rendering *a completed concrete or masonry structure damp-proof and waterproof.* The fact that it results in a clean, neat and pleasing surface renders its use satisfactory for plastering or lining basement walls, for surfacing floors, and other interior work. Full specifications for the application of this method appear on pages 22 and 23.

The Membrane System

The Membrane System is more expensive than the other two methods. It entails when applied to the outside of a basement foundation below grade, the additional amount of excavation necessary to allow sufficient working space for workmen to apply it to the walls. On a vertical face such as the basement walls of a building it is ordinarily held in place by a brick and mortar, or concrete retaining walls—sometimes the earth excavated from the hole is merely thrown against it. The extra cost of materials and the extra labor involved render it a very complicated and highly expensive process of accomplishing a quite simple result.

The possibility of making joints by this method around pipes and at the bottom of the outside walls, at footings, at junction of the basement floors and footings, and wherever joints or lapping occur, is very uncertain owing to the limited working space and difficulty in securing perfect adhesion of the asphalt to the concrete.

Perfect adhesion is seldom obtained where the membrane method is applied to concrete walls or floors, since the hot pitch is generally applied before the concrete is dry, which will prevent adhesion and cause blisters.

Blind Leaks

The greatest obstacle to membrane waterproofing is a "blind leak." This generally occurs after the waterproofing is installed and the protecting course of brick or concrete applied to the walls, and concrete protection to floors is in place.

During the application, in some careless or accidental manner the membrane may receive a cut or tear thru the several layers, exceedingly difficult to locate for repair. The water will enter at this point and gradually work its way under the membrane until it reaches a porous place in the concrete and seeps into the interior. If this particular place in the concrete wall is repaired and seepage stopped, the water will continue to work its way under the waterproofing, and unless another porous place is reached, will gradually loosen the entire envelope.

The membrane system as a whole is an artificial, and highly expensive method. In order to be successful it calls for the highest engineering skill in design and supervision, and the most competent labor.

Paints and Coatings

Up to this time, most of the paints and coatings for concrete or masonry surfaces have been bituminous or asphaltic in composition. These have not been satisfactory or permanent, in that they do not bond readily with concrete, are difficult to apply without the formation of pin-holes, are subject to rapid deterioration and tend to crack and peel off.

The thin asphaltic membrane is easily broken by the careless filling in of rocks, boulders, etc., against it if the dirt from the hole is badly filled in without sorting. Furthermore, the bond with the concrete surface is not in all cases perfect.

The Ideal Waterproofing Will Prevent Water-Absorption by Concrete

If we add to a concrete mixture in process of mixing, the proper amount of a finely divided *insoluble* water-repellent powder; or by combining with the gauging water a paste which is carried to all parts of the concrete and which by chemical reaction with the cement *lines* the pores and voids with a permanently water-repellent film which prevents the concrete from absorbing water or moisture, the result will be the distribution thruout the concrete of sufficient water-repellency to break down the capillary attraction.

In order to waterproof concrete successfully, the ideal material must fulfill the above requirements; it must also be concentrated and efficient enough to do the work when added to the cement without affecting the strength of the concrete.

It must be proof for all time against oxidation and such chemical action as may be met with from the concrete and from water or the atmosphere, and last but not least it must demonstrate in actual work that the concrete in which it is used is waterproof, even after a long period of time.

Medusa Waterproofing, the most concentrated waterproofing manufactured, fulfills all these requirements and has proved thoroughly satisfactory on thousands of important pieces of construction.

Powder or Paste?

In order to obtain the waterproofing effect described, a material capable of producing these results must be introduced into the concrete mixture and intimately mixed or in some manner disseminated uniformly throughout the concrete. This may be done in one of three ways:

(*a*) By the use of a waterproofing powder of stearic base.

(*b*) By the use of a waterproofing paste of stearic base.

(*c*) By using a Portland cement which, at the mill, has had a stearic waterproofing powder ground with the clinker, producing a waterproofed Portland cement.

(a) The waterproofing powder is used in proportions of two pounds of waterproofing powder per bag of Portland cement, and is mixed with the cement before the sand and aggregate are added.

In this way the waterproofing powder is entrapped thruout the concrete during process of mixing.

It cannot be claimed or contended that the waterproofing powder will fill the pores and voids of the concrete, altho it is undoubtedly true that some of the powder will be deposited therein. But it is the intention, by using a stearic waterproofing powder, to distribute sufficient water-repellency throughout the concrete to break down the capillary attraction.

Two per cent of waterproofing powder furnishes the maximum water-repellency required for any concrete, and no greater amount should be used even under extremely severe conditions.

In the quantity recommendations for waterproofing powder a factor of safety has been considered, similar to other materials used in building construction.

In using a stearic waterproofing powder it is recommended that the gauging water be added slowly, and only enough to give that consistency which will permit the easy placing of the concrete. Every precaution should be taken to prevent the use of any surplus water.

(b) The use of a Waterproofing Paste of a stearic base to waterproof concrete is preferred by some contractors and users, owing to the ease by which it may be used.

Waterproofing Paste should be used in proportions of two pounds per bag of Portland Cement, or 2%. This quantity furnishes the maximum water-repellency required for the most severe conditions while 1½ pounds per bag—1½%—of Portland Cement may be used under favorable conditions.

Waterproofing Paste is dissolved in the gauging water with which the concrete is mixed, and in this way, is thoroughly and uniformly distributed throughout the concrete.

The chemical combination of the lime in the cement with the stearates of the Waterproofing Paste forms a calcium stearate lining on the walls of the pores and voids of the concrete, thereby furnishing sufficient water-repellency to prevent absorption by breaking down the capillary attraction.

The contractor or user should regulate the amount of water used in mixing the concrete, so as to be certain to obtain the proper proportions of Waterproofing paste.

The Waterproofing Paste should not contain any inert materials, and will remain in perfect suspension indefinitely.

(c) The most satisfactory method of incorporating integral waterproofing in concrete is by using a waterproofed Portland cement, either gray or white.

The contractor who uses waterproofed Portland cement, is saved the necessity of mixing the waterproofing powder with his Portland cement, or waterproofing paste with the gauging water at the job; he buys but one material instead of two, generally at a cost less than two, and he is saved all extra labor in connection with the work.

All the contractor must do in using a waterproofed Portland cement is to follow the ordinary practice of pouring good merchantable concrete, and the job will be impervious.

The choice between Medusa Waterproofing—Powder or Paste—is left to the individual preference of the user.

Medusa Waterproofing does not decrease the strength of concrete. On the contrary, it tends to increase the strength as shown in the reports of various tests, given below.

Waterproofed Gray Cement is more widely used in the territories adjacent to the Portland Cement Mills producing such a cement.

Waterproofed White Portland Cement is readily obtained in any part of the United States.

In producing waterproofed Portland cement, a stearic waterproofing powder is ground with the clinker, thus securing the most thorough and satisfactory mixing of the Portland cement and waterproofing.

By specifying waterproofed Portland cement, the Architect or Engineer knows that the waterproofing will go into the concerte which is to be waterproofed; he knows that the proper percentage will be used; he knows that all the contractor must do is to pour good, merchantable concrete, and he will have impervious concrete.

Medusa Waterproofing Meets Diverse Tests

The real evidence that Medusa Waterproofing is effective in reducing to a minimum the water absorption of concrete, cement plaster and cement mortar is shown by its successful use in a large number of very important pieces of construction.

In the Woolworth Building, New York City, for instance, in which Medusa Waterproofed White Portland Cement was used for mortar for setting of the limestone and terra cotta, there is today, after about 12 years, no sign of a weeping joint. Other conclusive examples of the successful waterproofing effect afforded by Medusa Waterproofing under many varying conditions of use are illustrated throughout this catalog. We have repeated calls, however, from Engineers and other technically trained authorities for examples of laboratory tests con-

ducted to determine the amount of effect produced by the use of Medusa Waterproofing in concrete and cement mortar.

It is very difficult—almost impossible—to reproduce in the laboratory the exact conditions encountered in commercial construction or to construct specimens which are truly representative of commercial concrete or cement mortar.

The tests which are of greatest value as reproducing actual conditions to the greatest possible extent, are those to determine:

(1)—Permeability.

(2)—Absorption.

Unfortunately the chance of error in the Permeability tests is greatly enhanced by the possibility of a single set of connection pores forming a tube through the mass, or the occurrence of a mintue crack by shrinkage or otherwise which will permit the passage of water.

By the use of thousands of extremely large test pieces with large and costly apparatus, and a series of tests designed to employ a wide range of concrete and mortar mixtures under wide limits of pressure, it may be possible to secure results representative of commercial conditions. The value of such tests is, however, problematical.

The late Dr. S. B. Newberry, inventor of Integral Method Waterproofing, in September, 1905, made strength tests with plain and waterproofed blocks for 7 days and 28 days. The cement used in the waterproofed blocks carried 1½% of Medusa Waterproofing Powder. The blocks were made of 1 part waterproofed cement and 3 parts sand. The plain blocks were 1 part of unwaterproofed cement and 3 parts sand. The tests show as follows:

Un-waterproofed Block, 7 days.	Waterproofed Block, 7 days.
266 lbs. per sq. in.	320 lbs. per sq. in.
276 lbs.	318 lbs.

Un-waterproofed Block, 28 days.	Waterproofed Block, 28 days.
371 lbs. per sq. in.	381 lbs. per sq. in.
374 lbs.	429 lbs.

A Word as to the Quantity of Waterproofing Needed

Though somewhat less than the quantity recommended may be used in many cases with excellent results, it has proved advisable in any structural work to have a reasonable factor of safety.

The need of such a factor of safety will be appreciated when the varying conditions affecting concrete work are considered. Specifications vary considerably and so also do the aggregates selected.

It has been found that the quantity prescribed, 2% of the weight of cement (8 lbs. to the barrel) is the correct amount to be used. A reasonable factor of safety is included in this figure and we advise that this specification be rigidly maintained.

The Workmanship Must be Good

It must be remembered that the addition of a perfect waterproofing agent does not compensate for faulty design; improper proportions or materials, imperfect mixtures of the cement, sand and aggregates, contamination of the mixture with dirt, clay, loam, etc., excess or insufficient water or poor workmanship at any stage of the work.

Proper precautions must be observed in order to obtain good concrete by following proper methods. Literature and lists of reference works on concrete, both plain and reinforced in all its phases, can be had from the nearest offices of the Portland Cement Association, of which this Company is a member, or direct from us.

The Slightest Excess of Water in the Mix Will Reduce the Strength of the Concrete

Prof. Duff A. Abrams, of the Structural Materials Research Laboratory, Lewis Institute, in pamphlet, "Design of Concrete Mixtures," makes the following statements concerning the amount of water which should be used for mixing concrete:

> "With given concrete materials and conditions of test, the quantity of mixing water determines the strength of the concrete, so long as the mix is of a workable plasticity.
>
> "All of the methods of proportioning concrete which have been proposed in the past have failed to give proper attention to the water content of the mix. Our experimental work has emphasized the importance of the water in concrete mixtures, and shows that the water is, in fact, the most important ingredient, since very small variations in water content produce more important variations in the strength and other properties of concrete than similar changes in the other ingredients.
>
> "One pint more water than necessary to produce a plastic concrete reduces the strength to the same extent as if you should omit 2 to 3 lbs. of cement from a bag batch.
>
> "Without regard to the actual quantity of mixing water, the following rule is a safe one to follow: *Use the smallest quantity of mixing water that will produce a plastic or workable concrete.*"

SECTION I

The Records of Some Important Tests

DIGITIZED BY APT

Wilmington Laboratory, G. & T. Earle, Ltd., Hull, Percolation Test

(By Earle's Improved Apparatus)

Nature of Observation desired: Impermeability of Medusa and Cement Plastering — No. of Test 56

Size of test {Surface area 144 square inches / Thickness, 1 inch

Finish of top surface, trowelled

Quality of cement {Fineness 2% on 32400 / 7 days' neat tensile strain 660 lbs.

Date {Sample gauged August 7 / Pressure applied Sept. 21

Days old before tested, 45

Days duration of test, 35

Setting {Initial 65 min. / Final 300 min.}

Liquid used for test, water

If water, degree of hardness or purity, 21 degrees

Pressure per square inch on test 20 lbs.

Head of water in feet on same, 46

Temp. proportion of Cement used / 60 deg. F. in specimen by weight

Prop. of 25% .... / Water in gauging {10%

Nature of Aggegate, Trent Sand and Cement 1″ topping on lean concrete 6.2.1. By weight used 75%

Memo.—16.386 cubic centimetres equal 1 cubic inch of which there are 277¼ to gallon (English measure)

Date of Registry	Time of Day	Hours since last registered	Cubic c/metres passed	Date of Registry	Time of Day	Hours since last registered	Cubic c/metres passed
Sept. 21	10 A. M.	24	nil	Oct. 9	10 A. M.	24	nil
" 22	"	24	"	" 10	"	24	"
" 23	"	24	"	" 12	"	48	"
" 24	"	24	"	" 13	"	24	"
" 25	"	24	"	" 14	"	24	"
" 26	"	48	"	" 15	"	24	"
" 28	"	24	"	" 16	"	24	"
" 29	"	24	"	" 17	"	24	"
" 30	"	24	"	" 19	"	48	"
Oct. 1	"	24	"	" 20	"	24	"
" 2	"	24	"	" 21	"	24	"
" 3	"	48	"	" 22	"	24	"
" 5	"	24	"	" 23	"	24	"
" 6	"	24	"	" 24	"	24	"
" 7	"	24	"	" 26	"	48	"
" 8	"						

Water Absorption Tests

Effect of Medusa Waterproofing Powder

Four 4-inch cubes were made up 1 part Cement, 10% water and with different proportions of Medusa. These were weighed and placed in water and after three months were taken out, weighed again and then broken in a compression Testing Machine.

Four Cubes made up of 5 parts sand, 1 part cement, 10% water, weight as under, at 3 months	Increase in weight after being in water 21 days	Crushing strength per square inch at three months
One Cube, 4 inch, 5 lbs. 5 ozs. 2% Medusa added.....	2 ozs.	1330 lbs.
One Cube, 4 inch, 5 lbs. 3½ ozs 1½% Medusa added....	2½ ozs.	1288 lbs.
One Cube, 4 inch, 5 lbs. 3½ ozs. 1% Medusa added.....	2½ ozs.	1246 lbs.
One Cube, 4 inch, 5 lbs. 2 ozs. No Medusa added.....	3¾ ozs.	1190 lbs.

Percolation Tests

A slab of Mortar one inch thick composed of 2 parts of sand to one part of Cement containing 2% of Medusa and subjected to a pressure of water 20 lbs. to the square inch (equal to a head of 46 feet) 45 days after being mixed, was found to be absolutely water-tight, not a single drop of water passing through during the period (35 days) the pressure was sustained.

Crushing Tests

Naturally in preparing concrete for water-tight work, non-porous aggregates should be selected; also satisfactory results have been obtained with porous aggregates such as Broken Brick, etc.

From the following tests it will be seen that Medusa Waterproofing Compound has no detrimental effect on the strength of concrete, in some cases slightly lower strength has been observed at the earlier dates, but this has been recovered at a later period.

Effect on Concrete Blocks at 28 Days, made up of:

Spurn Gravel.....3½ parts
Spurn Sand.....1½ parts } .....5219 lbs. per square inch.
Cement .....1 part

Cement with 1% Medusa Waterproofing added..5980 lbs. per square inch.

Broken Brick.....3½ parts
Brick Sand.....1½ parts } .....3505 lbs. per square inch.
Cement .....1 part

Cement with 1% Medusa Waterproofing added..4345 lbs. per square inch.

Granite .....27 cu. ft.
Sand .....13½ cu. ft. } .....7660 lbs. per square inch.
Cement ..... 8½ cwt.

Medusa 2% (of cement) .....7680 lbs. per square inch.

Absorption Tests of Portland Cement Stucco

Made with Medusa Waterproofed Cement and with Ordinary Unwaterproofed Cement

The following test was made to determine the difference in absorption between the stucco made with Medusa Waterproofed Cement and ordinary unwaterproofed cement. Medusa Waterproofed Gray Portland cement was employed throughout in specimen No. 2, plain Gray Portland cement being used throughout in No. 1.

The specimens were allowed to harden one day in moist air, immersed in water for one week, then air-dried for one month at room temperature. The specimens were then immersed in water. The weights of the different test pieces together with their gain in weight at the end of periods of one hour, two hours, three hours, six hours and twenty-four hours, are given herewith, together with the percentage of water absorption compared with the total weights at these intervals. Our experience in making absorption tests indicates that the absorption of such specimens is relatively complete at the end of twenty-four hours. The experiment was accordingly not carried beyond that period, the intention being to simulate actual conditions of exposure to rain, mist, sleet and snow.

It will be noted that in the case of the unwaterproofed sample, the gain in weight, as a result of water absorbed was substantial and immediate, the water being absorbed with very little difficulty, 9% of its weight of water being taken up by the sample in the first hour. The total gain in twenty-four hours was 10.9% in the case of the unwaterproofed specimen. In the case of the specimen containing Medusa Waterproofed Cement, the absorption proceeded slowly owing to its water-repellent nature and probably slightly greater density, only 1.98% was taken up in the first hour and only 3.88% in the first twenty-four hours.

No. 1, Plain Portland Cement, unwaterproofed.
No. 2, Medusa Waterproofed Gray Cement.

All blocks 1 part cement 3 parts Kelly Island Sand.

Weight of specimens.....	1 hr.	2 hrs.	3 hrs.	6 hrs.	24 hrs.
Per cent of its weight absorbed.....	9%	9.3%	9.5%	9.7%	10.9%
No. 1—5195 grams	465 grams	485 grams	495 grams	505 grams	565 grams
Per cent of its weight absorbed.....	1.98%	2.5%	2.67%	2.84%	3.88%
No. 2—5800 grams	115 grams	145 grams	155 grams	165 grams	225 grams

These tests constitute a strong endorsement of the efficiency of Medusa Waterproofing and Medusa Waterproofed Gray Cement in view of the decreased water absorption (and corresponding decrease in permeability) of the concrete or stucco.

Absorption Tests of Concrete Slabs

Containing Medusa Waterproofing Paste and Powder, and Untreated, Made June 30, 1918

The slabs were made 9¼"x¾" in wood frames, under precisely the same conditions and contained the same amount of cement, sand and water. After rodding off, the surface of each slab was blanketed with canvas and sprinkled with dry sand to remove any film giving only temporary waterproof results, and was troweled to a finish in 45 minutes.

Bank Sand Mix

All sand passed through ⅛ inch mesh sieve, with 10% through a 60 mesh sieve. Voids 35% by water. One part cement, 3 parts sand. Plastic consistency.

After 24 hours, the slabs were packed in wet sand for 14 days, removed and allowed to become bone dry. After weighing, they were submerged in water for 24 hours, then taken out and wiped with a dry cloth, and again weighed with results as follows:

	Percentage of increase by weight after 24 hours' absorption.
No. 1—2% in weight of the cement, Medusa Waterproofing Powder.....	.78%
No. 2—2% or 1 to 20 solution, Medusa Waterproofing Paste.....	.85%
No. 3—Untreated	3.07%

The test slabs ranked in apparent dryness by observation, after one hour in dry atmosphere, as follows: *No. 1—first; No. 2—second; No. 3—third.*

Absorption of Concrete Test Blocks, Plain and Waterproofed

The average demand made of a waterproofing agent is that it shall reduce capillary attraction of the concrete or mortar sufficiently to prevent the intrusion or absorption of any appreciable amount of water, from rain or from water standing against it for brief intervals, with no considerable pressures involved. For this reason absorption tests are closely representative of actual conditions.

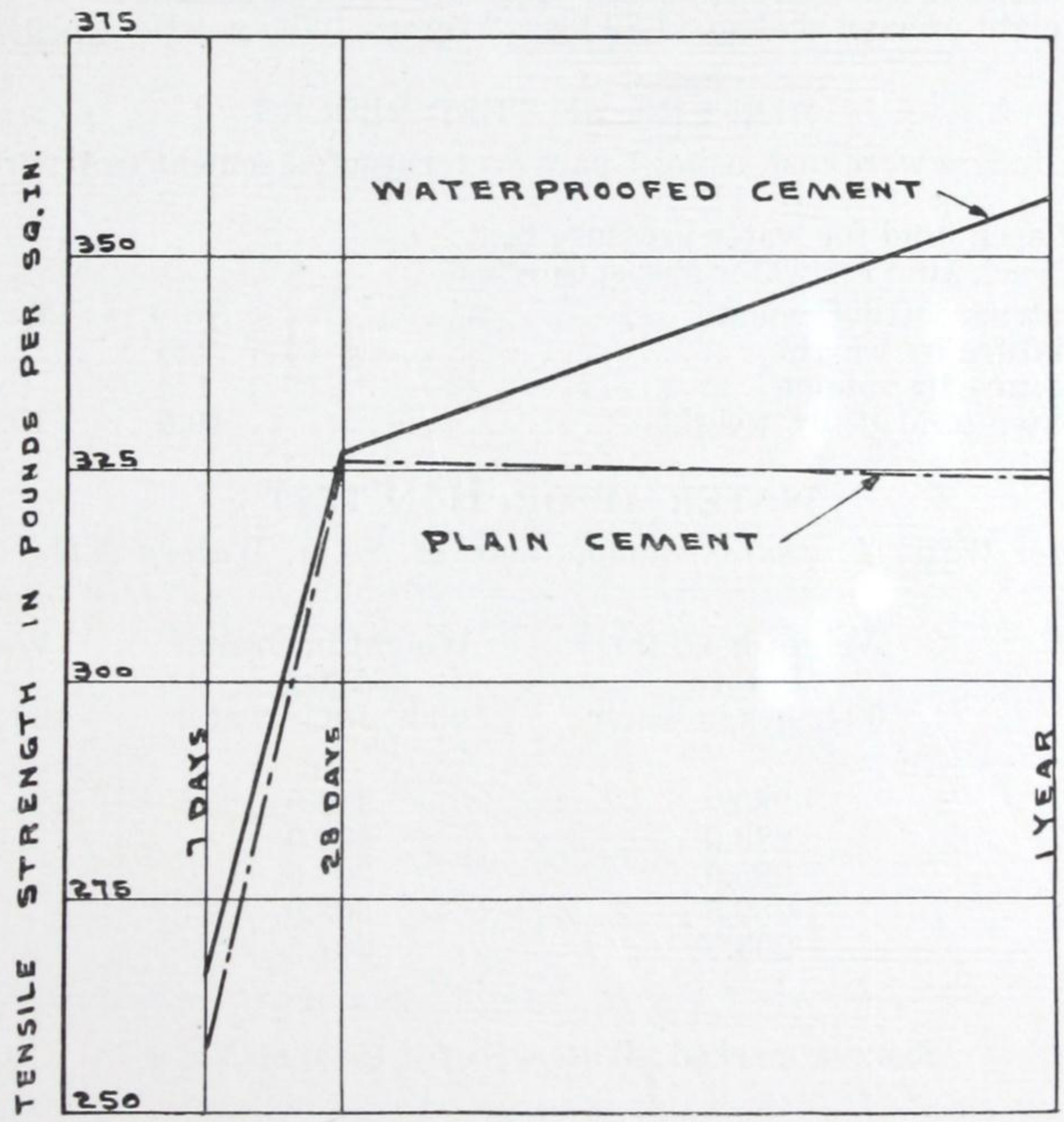
The following is an example of a test made on water absorption of blocks 1½"x3" of 1:2:4 concrete, wet mixture, laid flat in water, half immersed, with and without Medusa Waterproofing. Percentage of water used in making up samples was the same in each case.

This test was made with the idea of simulating the actual conditions of concrete basement exposed to heavy rains.

Water Absorption, 1:2:4 Concrete.
Percentage Increase in Weight of Test Pieces.

	Time			
	1 hr.	2 hrs.	4 hrs.	24 hrs.
No Waterproofing	5.8%	6.4%	7.7%	8.0%
1% Medusa Waterproofing	1.1%	1.3%	1.5%	2.3%
2% Medusa Waterproofing	0.9%	1.0%	1.0%	1.7%

In the case of Waterproofed Cement specimens the slight absorption takes place in the first few hours, the weight of samples immersed in water being practically constant after 24 hours.



Comparison of Tensile Strength of Medusa Cement—
Plain and Waterproofed

Average of 200 tests of cement with three parts sand, from The Sandusky Cement Company's Mills at Bay Bridge, Dixon and York, showed that Medusa Waterproofing tends to *increase* the strength at short periods, and especially at greater age.

Water Absorption and Water Pressure Tests of Medusa Waterproofed Cement

Made at the Christiania Testing Laboratory, Christiania, Norway

SAND

For testing was used, Svelvik sand (a well known clean sand, located a few miles south of Christiania).

SIEVE TEST

Res. on 4 meshes pr. cm²..... 4% 26 meshes per sq. in.—5 meshes per linear inch.
Res. on 9 meshes pr. cm²..... 10%
Res. on 20 meshes pr. cm²..... 17%
Res. on 60 meshes pr. cm²..... 31%
Res. on 120 meshes pr. cm²..... 49%
Res. on 324 meshes pr. cm²..... 80%
Res. on 900 meshes pr. cm²..... 92%

Weight of sand (liter) loose=1.63 kg.=101 lbs. per cu. ft.
Weight of sand shaken=1.89 kg.=Average 1.76 kg.=109 lbs. per cu. ft.

MIXTURE OF TEST BLOCKS

20 concrete cylinders were cast, using 1 part Waterproofed cement to 4 parts sand (volume) —1:5 by weight.

10 pieces, 5 of each kind for water pressure test.
10 pieces, 5 of each kind for water absorption test.

	No. 1	No. 2
Waterproofed Cement		
Mixture by weight	1:5	1:5
Mixture by volume	1:4	1:4
Water used % by weight	10.5	10.0

WATER ABSORPTION TEST

One Meter Water Pressure—Sample marked No. 1, Waterproofed Cement

Sample No.	Weight in Gram. Before 100 hours in water	Weight in Gram. After 100 hours in water	Water Absorbed After 100 hours in water
1	289.0	303.0	4.8%
2	289.0	302.0	4.5%
3	285.0	303.0	4.6%
4	289.5	303.0	4.7%
5	293.5	307.5	4.8%..4.7%
Sample marked: *Waterproofed Cement No. 2*			
1	276.0	283.5	2.7%
2	275.0	283.0	2.9%
3	275.0	283.0	2.9%
4	270.0	278.0	3.0%
5	274.5	282.0	2.7%..2.8%

Before the test the samples were kept for 2 days in air, 12 days in water and 14 days in air.

TEST FOR WATER PENETRATION UNDER PRESSURE

Concrete cylinders with a mixture of 1:4 (volume) diam.=65 m/m=2½ inches, height 40 m/m=1.6 inches water pressure surface (Diam.) 50 m/m=19.6 cm². Diam. of water column 20 m/m=3.1 cm². Before the test these cylinders were kept 2 days in air and 26 days in water.

Sample marked: *Waterproofed Cement No. 1*

Sample No. 1	Weight in Gram. Before Test	Weight in Gram. After Test	Water Absorbed 4 Atm. after 48 hours	Water pressed through with	
				2 Atm. In 48 hrs.=cm³	4 Atm. In 48 hrs.=cm³
1	310	313	1.0%	3.7	15.5
2	310	314	1.3%	9.9	33.5
3	310	313	1.0%	5.6	21.1
4	309	313	1.3%	18.6	63.9
5	311	315	1.5%	13.3	49.0
Average.....	.....	.....	1.2%	10.2	36.6

Sample marked: *Waterproofed Cement No. 2*

1	294.5	302	2.5%	2.5	9.3
2	296.0	305	3.0%	1.2	4.7
3	295.0	304	3.0%	0.6	1.9
4	301.0	310	3.0%	2.8	10.9
5	298.5	306	2.5%	1.6	6.2
Average.....	.....	.....	2.8%	1.7	6.6

DECLARATION

I hereby testify that I was present, and saw two duck sacks filled with waterproofed cement.

Bag No. 1 contained *.....x cement, sent here from.....x Portland Cement Fabrik, filled from the original bag, as it comes from Germany.

Bag No. 2 contained Medusa Waterproofed Cement ground and mixed in my presence.

Both bags were sealed by me with the seal of Brevik's Police station's seal.

Brevik Police Station, Brevik,

June 4, 1923

Otto Isacksen
(Seal)
Brevik Police Station

(*Is a well known brand of German Waterproofed Cement.)

Arcade Building, St. Louis, Mo.

The entire basement retaining walls, both first basement and sub-basement in this building are constructed of Medusa Waterproofed Gray Cement.

Thomas P. Barnett and Company, Architects, St. Louis, Mo. John Hill Construction Company, General Contractors. Medusa Products furnished by the Glencoe Lime and Cement Company.

On August 5th, 1924, Mr. Hill states that there has never been a complaint of any dampness, and that so far as he knows both basement and sub-basement are absolutely dry.

SECTION II

Medusa Waterproofing— General Specifications, Tables of Materials, etc.

DIGITIZED BY APT

Pits in 12 Feet of Water—Perfectly Dry Inside

FARMERS' ELEVATOR COMPANY, GLIDDEN, IOWA. This 65,000 bushel elevator, built in 1920 by the Nelson & Aldrich Construction Co., Spencer, Iowa, has put Medusa Waterproofing to a real test. The pits at times stand in 12 feet of water; yet they are always dry inside.

In a letter referring to a more recent job in which Medusa Waterproofing was used, as well as to the Company's general experience with "Medusa" products, Mr. W. O. Aldrich expressed his satisfaction as follows:

"This is the seventh waterproofed concrete elevator pit we have put in, and we have used Medusa on all of them with very satisfactory results.

"We wish to add, however, that any old kind of concrete with 'Medusa' added will not make a waterproof job. The right kind of materials must be used and then they must be mixed properly, with the correct amount of water added; and great care taken in placing the mixture. Needless to say this is not an operation where an amateur may expect successful results, even with 'Medusa' to assist him.

"Our pits have been from six to fifteen feet under the water line and have the same results in either case. Anything we are able to do to assist in spreading the news of what Medusa will do, we will be only too glad to do."

General Specifications

For Waterproofing of Mass Concrete for Foundations, Walls, Floors, Piers, Reservoirs, Tanks, Pits, Tunnels, etc.

Proportions

The Concrete shall consist of one (1) part cement, two (2) parts sand and four (4) parts aggregate.

Cement

The Cement shall be Medusa Waterproofed Portland Cement or a brand of equal quality, which will pass all the requirements of the Standard Specifications of the American Society for Testing Materials.

Waterproofing

If Medusa Waterproofed Cement is not available, then the contractor shall use Medusa Waterproofing, powder or paste, to waterproof the Portland Cement which is used.

Medusa Waterproofing Powder

(A) To render concrete or cement work waterproof, use 2 lbs. Medusa Waterproofing Powder with each bag of Portland Cement used (8 lbs. per barrel of cement), or 2% of the cement used.

If the Paste is used instead of the Powder, use 2 lbs. of Medusa Waterproofing Paste with each bag of Portland Cement used (8 lbs. per barrel of cement), or 2% of the cement used.

Method of Mixing Medusa Waterproofing Powder by Hand

If a mechanical mixer is not used, add the powder directly to the dry cement and mix by hand until the powder is uniformly distributed throughout the cement. To the dry mixture of cement and sand add the crushed stone and mix until a uniform batch has been secured. The above procedure differs in no respect from the thorough mixing recommended for all concrete, except by the addition of the powder and its dissemination throughout the cement.

If the Waterproof Cement is mixed with damp sand the mixture will take water much easier.

Mechanical Mixing

Where a concrete mixer is employed, the powder should be added directly to the cement at the hopper or on the loader. The time of mixing should be sufficient to insure uniformity throughout the mass and should not be lessened with a view to increasing speed. The water should be added slowly. The amount of water should be kept as low as conditions permit, a quaking consistency being generally most desirable.

Medusa Waterproofing Paste

(B) To render concrete or cement work waterproof, use 2 lbs. Medusa Waterproofing Paste with each bag of Portland Cement used (8 lbs. per barrel of cement), or 2% of the cement used.

Thoroughly mix the Medusa Waterproofing Paste with equal parts of water, and add this paste water to the gauging water.

If the Powder is used instead of the Paste, use 2 lbs. of Medusa Waterproofing Powder with each bag of Portland Cement used (8 lbs. per barrel of cement), or 2% of the cement.

Gauging Water

The amount of water per cubic yard of concrete varies greatly with conditions. It theoretically requires only about 20 gallons of water to the barrel of cement to make 1:2 mortar or 1:2:4 concrete. This would be 30 gallons to the cubic yard. In actual practice, however, the quantity of water used may be 40 to 60 gallons or even more per cubic yard. The amount of Waterproofing added should therefore be in proportion to the cement used.

We advise that the amount of water which a crew is using be determined and the correct amount of Medusa Waterproofing Paste be added to the gauging water so that for each barrel of cement used, 1 gallon of paste (8 pounds) goes into the concrete.

No more water shall be used than necessary to make a quaking or plastic consistency.

Sand

The sand shall be well-graded, clean, sharp, hard, and free from clay, loam, vegetable or other deleterious matter.

Aggregate

The aggregate shall be gravel, crushed trap rock, or crushed limestone uniformly graded so the largest pieces will pass a 1½″ ring.

Placing

Concrete shall be placed immediately after mixing and shall be well spaded to expel entrapped air and insure maximum density. If possible, pouring of concrete for the entire operation shall be continuous. If joints are not avoidable, however, extreme care shall be taken to remove all dirt and laitance from old concrete, the joint being saturated with water and given a good coat of cement grout.

General Specifications

For the Preparation and Application of Waterproof Cement Plaster to Existing Concrete Work, Such as Damp Basements, Leaky Concrete and Masonry Walls and Floors in Pits, Tunnels, Etc.

In *all new* Concrete, Concrete Blocks, Stucco, Cement Mortar, etc., which it is desired to have damp-proof and waterproof, use Medusa Portland Cement or a brand of equal quality with Medusa Waterproofing added.

When the necessary precaution has *not* been taken during construction to damp-proof a basement or to make concrete, concrete blocks or masonry waterproof, permanent results can be secured by following these simple directions:

Materials

Proportions

The cement plaster shall be composed of one (1) part cement and two and one-half (2½) parts sand.

Cement

The cement shall be Medusa Waterproofed Portland Cement, or a brand of equal quality which will pass all the requirements of the Standard Specifications of the American Society for Testing Materials.

Waterproofing

The contractor shall use Medusa Waterproofing, either powder or paste, to waterproof all cement plaster.

To render concrete or cement work waterproof, use 2 lbs. Medusa Waterproofing Powder with each bag of Portland Cement used (8 lbs. per barrel of cement), or 2% of the cement used.

If the Paste is used instead of the Powder, use 2 lbs. Medusa Waterproofing Paste with each bag of Portland cement used (8 lbs. per barrel of cement), or 2% of the cement used.

Sand

Sand shall be well graded, clean, sharp, hard and free from clay, loam, vegetable or other injurious matter.

Preparation of Surface

All paint films must be thoroughly removed by burning, scraping or sand blasting.

(A)—On Old Concrete

The old surface shall be mechanically roughened or hacked by means of stone masons' hammers, drills, or similar tools, exposing the matrix of the concrete and leaving ¼″ to ⅜″ deep holes every 2″ to 3″ so as to provide a better bond for the cement plaster. Remove all loosened pieces and apply freely to the cleaned area a solution of 1 part muriatic acid and 10 parts of water, using a fibre or acid brush. Allow acid solution to remain until the acid exhausts itself, approximately 10 minutes. Wash the surface with water from a hose, being careful to remove all of the acid solution. Go over the walls with a stiff wire brush, or, where available, compressed air or steam may be used, and remove any remaining loose pieces or particles.

Prepare a grout of Medusa Portland Cement and water.

Mix to a creamy consistency and apply with a fibre brush to the cleaned surface, brushing the grout thoroughly into the concrete.

(B)—On Brick, Concrete Block or Masonry

Mortar joints shall be raked out to a depth of ½″ to ¾″ and all old and loose mortar removed. This is absolutely necessary in order to give a good key for the plaster.

All masonry surfaces shall be thoroughly saturated with water before grouting is applied.

Prepare a grout of Portland Cement and water mixed to a consistency of heavy cream.

Mix to a creamy consistency and apply with a fibre brush to the cleaned surface, brushing the grout thoroughly into the concrete.

Mixing

Using materials as heretofore specified, mix the waterproofed cement plaster to a stiff workable consistency, adding the water slowly, using the minimum volume of water necessary to give a plastic mix.

By wetting the aggregate to the consistency of damp earth, then raking in or machine mixing the necessary amount of waterproofed cement before adding the water, there will be no difficulty in incorporating sufficient water to make a workable mixture.

Application of Cement Plaster

Partially saturate the entire surface with water to prevent the surface from absorbing too much water from the cement plaster before the cement has had time to hydrate or set.

Apply the first coat of plaster ⅜″ thick, trowelling the plaster well into the surface so as to secure a proper bond.

Scratch the first coat, being careful not to cut through the coat.

As soon as the first coat has set hard enough, dampen with water and apply the second coat ⅜″ thick, trowelling the plaster with sufficient pressure to obtain maximum density and to close all surface pores, leaving a tight, close-grained finish.

Where the Waterproofed Cement Plaster is to be applied to the walls and floors, cut the second coat of plaster off 6″ above the finished floor line.

After the walls have been plastered, prepare the surface of the floors including the 6″ base at walls in the same manner as the walls.

(See "Preparation of Surface," page 22.)

Have the floors cleaned, saturated with water and apply the coat of grout as described. Use extreme care to prevent mud or dirt being brought on or tracked over the grouted surface.

Apply a 2″ coat of waterproofed cement plaster over the floor, joining the coved base with the finished wall cement plaster.

Where joints must be made in cement plaster work, run the cement work an inch or two beyond the contemplated joint. After plaster has set, cut this surplus off on as broad bevel as possible, giving this bevel a coat of grout prior to applying subsequent plaster.

Keep Finished Surface from Drying Out Too Fast

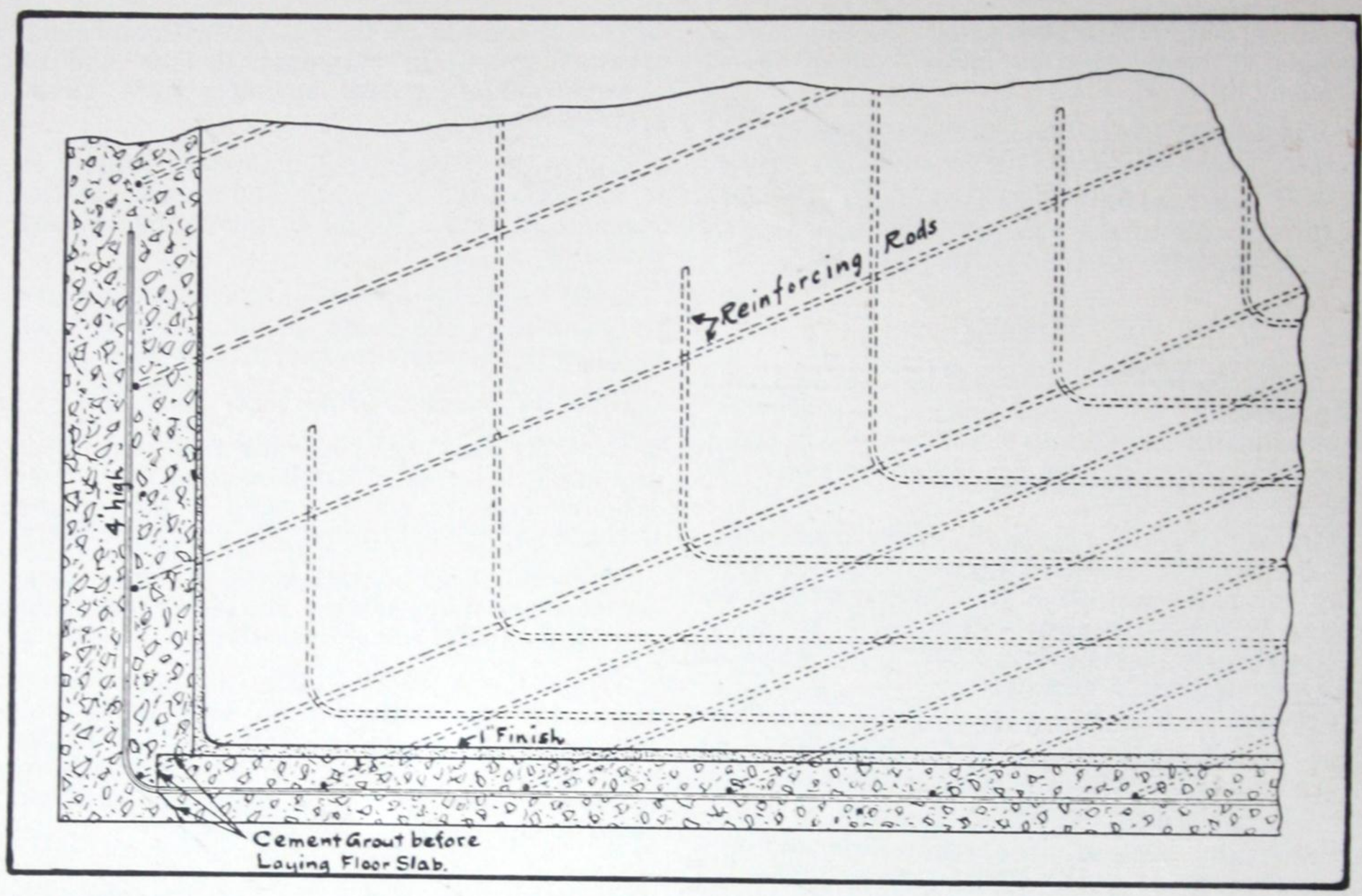
The finished surface must be protected from too rapid drying out, by keeping moist for at least a week to allow it to harden thoroughly and to prevent hair-cracks. Sprinkle at frequent intervals with a hose, or cover with canvas or burlap kept continually wet.

In Case Water Interferes With the Work

If there is a continual seepage through the walls, holes must be bored in the walls and tubes or small gas pipes inserted to concentrate the flow of water and relieve the pressure while the plaster coat is being applied. Caulk around pipes with oakum or lead wool. Drainage pipes should remain open until the waterproofed cement plaster coat has thoroughly set and is capable of resisting the pressure by its own adhesive strength, after which remove pipes and plug holes, covering them with waterproofed cement plaster.

Note: A quick-setting cement is made as follows: To a small quantity of Litharge add one-half of its volume of sodium carbonate (soda-ash). Then mix equal parts of glycerine and sodium silicate. Mix sufficient of this solution with the Litharge to render it plastic, and apply at once. This mixture will set immediately. The materials can be obtained at any drug store. *This method is excellent for plugging holes in concrete and masonry until they can be cemented over with Medusa Waterproofed Portland Cement Plaster.*

If the water pressure is exceedingly great, it will be necessary to sink sumps on the exterior of the walls to a depth below the basement floor level and keep pumps going until the plaster is thoroughly set.



General Specifications

For Placing Medusa Waterproofed Concrete Against Water Pressure

The following formulas represent the combined judgment of several experienced cement men and have been worked out after consultation with men highly successful in this particular type of engineering practice

Sump Pumps: Where possible after excavation is complete, make a sump hole outside the foundation, with drain pipe leading to it from the excavation, passing under the side wall. Where this is not practical, insert a pump hose into a threaded iron pipe with cap to fit and embed it in loose rock below the floor level. After it has served its purpose, seal this as described under the paragraph headed "Inlet Pipe." All water must be kept below the floor mat for at least 24 hours under ordinary circumstances, and 48 hours in very moist soil. Stopping the pumps will result in porous concrete. To determine the rise and fall of the water, fasten a stick in a large cork and insert it into one of the inlet pipes.

In the case of waterlogged quick sand, mud, or other extremely wet excavation floors, all surface water must be carried off to a sump through a series of drains. Where mud or quick sand are encountered embed 2 inch planking and cover the top with large clinkers. In such cases dampen the large aggregates, mix them thoroughly with the dry sand and waterproofed cement hereafter specified and without adding more water, place it in this consistency, tamping well.

Inlet Pipes: Under water pressure, where practical, insert threaded 4 inch iron pipes with caps in the floor to a loose rock footing at points where the pressure is the greatest. (Often one pipe is sufficient.) The top of the pipe should be a little lower than the surface level of the floor. After the concrete has become sufficiently set (about 24 hours) allow water to flow in through the pipe and let the concrete cure in this water.

After one week, screw on the caps and pump the cellar dry. Where it is not convenient to use a 4 inch pipe, a 2 inch lead or iron pipe may be used, and instead of capping, if desired, it may be cut off below the floor level, stopped with wooden plugs, and cemented over.

Reinforcing: Where the water pressure does not exceed 1 foot above the floor level it will not be necessary to reinforce the concrete. For pressures greater than this, the following reinforcement should be used:

2 foot water pressure, reinforced with ½ inch rods 12 inch. o.c. Side wall rods, alternate 2 feet and 4 feet high.

3 foot water pressure, reinforced with ½ inch rods 12 inch o.c. Side wall rods, alternate 3 feet and 5 feet high.

4 foot water pressure or over, reinforced with ¾ inch rods 12 inch o.c. Side wall rods, alternate 4 feet and 6 feet high.

The rods should be of sufficient length to extend across the entire floor leaving a slight convex crown at the center and up the side walls to the desired height. Perpendicular rods for the side walls must be tied together with ½ inch horizontal rods, 18 inches apart.

When the foundation walls are more than 30 feet apart, the center should be held in place by a partition wall or heavy iron girder placed during the course of construction.

Forms: Forms should be placed on both sides for the foundation walls, closely supported with studs according to the height, and well braced on either side. Avoid wiring the studs through the forms. The foundation of the forms must be skirted with 4 inch planking or studding to form a key for the floor mat.

Sand: Sand must be clean and sharp, all passing through a ⅛ mesh sieve, and not over 30 per cent through a 60 mesh sieve. An ideal sand would show in fineness, 100 per cent through ⅛", 80 per cent through 16, 60 per cent through 24, 40 per cent through 40, 15 per cent through 60 mesh sieve, and none through 100 mesh sieve.

Voids: Sands when bone dry must not show over 35 per cent voids.

Gravel or Crushed Stone: Gravel or crushed stone must run even in size from ¼ to 1 inch. Gravel will produce the greatest density, crushed stone the greatest strength.

Mix: Use 1 part Portland cement, 2 per cent Medusa Waterproofing by weight of the cement used (8 lbs. to the barrel of cement) 2 parts sand and 4 parts gravel or crushed stone.

Waterproofing: The Medusa Waterproofing must be first thoroughly incorporated with the dry cement by raking or sifting. Or use Medusa Waterproofed Portland Cement in place of Medusa Waterproofing and ordinary Portland.

If by hand the sand and Waterproofed Cement must be thoroughly mixed together and allowed to hydrate from 15 to 30 minutes before adding the larger aggregates. Add water slowly. The average run of bank sand contains 10 per cent moisture, sufficient to hydrate the waterproofed cement. Should the sand be dried, first add enough water to the sand to give the consistency of damp earth before adding the waterproofed cement.

Water: Only sufficient water should be added to give a stiff consistency, allowing no part of the mix to separate when pouring or spading. Wet mix causes the cement to float to the surface, injuring the waterproofing value of the work, and impairing the setting properties.

Placing of Concrete: Machine mixed concrete is preferable. Place the waterproofed cement and sand in the mixer first, then the larger aggregates. Pouring of the side walls should be done in one continuous operation. The key at the base of the side walls must be grouted with clear cement just before placing the concrete for the floor. The mix for the floor must be dumped directly against the walls and worked toward the center. Sloppy concrete should not be used for either the side walls or floor. Get the proper density by spading and tamping, giving special attention to the interior and exterior of walls and particularly so where the floor and side walls connect.

Curing: After 24 or 48 hours, cease pumping, and allow the water to enter through the inlet pipes and find its level within the interior. Permit the water to remain for one week or longer, treating as before described under the paragraph headed "Inlet Pipe."

The following method is applicable to existing concrete basements, swimming pools, tanks, etc., which are leaky or permit the absorption or passage of moisture.

Finish Coat: Should a finish coat be desired, roughen the floors and walls with a pick or bush hammer, when the work is one week old or more. Clean the surface with a stiff brush and wet well with clean water. Grout with clear cement just before applying the waterproofed cement plaster which should consist of 1 part Medusa Waterproofed Cement and 2½ parts sand, graded as before mentioned. The finish coat should be placed not less than 1 inch thick carrying it up the side walls to the height of 8 inches to form a sanitary base. For side wall plaster, leave the edge of base course rough and grout as before directed. Avoid excess troweling, which tends to cause hair-cracks. When sufficiently set cover the floor with wet sand and keep the walls moist for one week.

Medusa Waterproofing Prevents Concrete from Absorbing Sea-Water, and Protects the Reinforcing Against Corrosion

Inspection of a great number of concrete jobs, placed in or adjoining sea water, has disproved the general contention that disintegration is entirely chargeable to action of salt water. The same inspection has demonstrated that other very important factors must be given the same careful consideration, if really permanent concrete is to be secured.

Sea water concrete, like inland concrete, should and must be the best concrete possible to make and place. This involves the greatest possible accuracy—it is never had by guessing—at the quality of sand and stone used, the proportioning of the mixture, the amount of gauging water per batch, the time of the mixing, or permitting careless placing in improperly made forms.

The sand must be tested for its hardness and grading, as well as for its content of clay, loam, soluble salts, and organic impurities. Bank sands or those known to be irregular in quality and grading, should be tested frequently. Sieve tests are very important to assure proper grading and density.

Sand containing over 5% clay or loam, or containing enough dust or fines so that more than 15% will pass a No. 60 mesh, should be rejected as unfit for use.

The gravel, stone, granite or trap rock used for the larger aggregate should, like the sand, be clean, hard, and free from dust and impurities. A grading which will give the greatest density should be adopted and then rigidly adhered to. Tests should be made periodically to check the grading and quality of the aggregate.

Soft sand, stone, or gravel; flat, thin, creek-bed gravel; or stone carrying layers or strata of mica, should not be used for good concrete where strength is an item of importance.

The proportioning of the cement, sand and large aggregate should not be on a hap-hazard basis such as a 1:2:3, 1:2:4 or 1:2½:4½, but *the proportions should be definitely ascertained on the job by the Engineer in charge, so as to obtain the greatest possible density.* When the proper proportions are definitely determined there should be no deviations unless there is a change in the grading of the sand and aggregate.

While it is universally recommended that the water used in mixing concrete is to be clean, free from chemical impurities and sewage, and fit to drink, sea water has been used in making concrete with excellent results.

One known instance is some concrete work in Manila Harbor under the direct supervision of the U. S. Government. It has also been reported that the British Admiralty permitted the placing of concrete mixed with sea water in some of its work in England, as well as in India. (Specific operations and locations withheld.)

The amount of water used in mixing concrete should be constantly regulated, slump tests being made if necessary to secure the consistency which will allow proper and economical placing, wet enough so that with some spading and tamping, the concrete will completely imbed the reinforcing and permit of no air pockets or honeycombed places.

The moisture content of the sand and aggregate must be considered in reckoning the amount of gauging water, as concrete carrying an *insufficient* amount of water is not so strong as that which is properly mixed, nor is the reinforcing so well covered and protected. The air is not expelled; therefore the concrete is quite porous and readily absorbs water and moisture.

On the other hand when *too much* water is used, poor concrete again results, due to the separation of the cement and the aggregates.

The danger point in sea water concrete is the tide line, where the concrete is constantly subjected to alternate expansion and contraction, due to the ever rising and falling of the tides.

In northern climates during the winter months the water absorbed by unwaterproofed concrete will freeze, causing additional disintegration.

Sea Water Concrete Which Will Absorb Water Is Not the Proper Protection for the Steel Reinforcing Used

It is but a matter of time until the reinforcing will rust and cause the outer shell of concrete to crack, this permitting the entrance of a greater volume of water, accelerating the rusting of the bars, and the spawling of the concrete—certain and positive steps toward ultimate and rapid disintegration.

Good concrete, waterproofed with Medusa Waterproofing, provides everlasting protection against the penetration of moisture or water—

thus eliminating the danger of disintegration due to undue expansion and contraction, frost or freezing, or the rusting of the reinforcing steel.

Due to the high percentage of water-repellency carried by Medusa Waterproofing, the absorptive properties of the concrete are permanently destroyed, not only on the surface *but throughout the entire body.*

Medusa Waterproofing Is Giving Entire Satisfaction in the Following Structures

CONCRETE FLOAT—Government Landing, Newport, R. I. Engr. Lt. Kirby Smith, 4" walls, not any sign of disintegration after ten years. Still in constant use.

NEWPORT, R. I.—All Government work, including stucco, plaster and concrete.

NEWPORT, R. I.—The Standard Wholesale Co., Long Wharf.

NEWPORT, R. I.—Police Station, 4' tide water pressure.

WARREN, R. I.—Disposal Plant and Pumping station. 12' tide water pressure.

NEW LONDON, CONN. — Experimental Tank, U. S. A., Fisher's Island, Waterproofed Cement for stucco over metal lath on all out buildings. Exposed to driving storms and spray. Standing for 12 years without bad effect.

NEW LONDON, CONN.—H. R. Douglass, Contractor. Many jobs under tide and salt water conditions.

LONG ISLAND, N. Y.—Salt water tests made by H. M. Underwood, U. S. A. Engineer.

Medusa Waterproofing has been used by both the U. S. Army and Navy at Indian Head Proving Grounds, Md., Norfolk, Va., Hampton Roads, Va., Portsmouth, Va., and Navy Yard, Washington, D. C.

Medusa Waterproofing Prevents the Corrosion of Steel in Concrete

In many installations of concrete, the protection of the concrete from water, moisture or dampness is not so important as the protection of the reinforcing steel. For instance, the foundations of a large power house recently built are entirely submerged and will be constantly under water. How to protect the reinforcing in this concrete was puzzling the Engineers until it was decided to waterproof the concrete. This prevents the percolation of water and the reinforcing is safe.

Mining Engineers should consider this point very carefully, as they must protect their concrete from acid waters, which are encountered in underground construction.

As noted in the following article by Dr. W. H. Walker, it is suggested that Architects and Engineers give serious consideration to the subject of thorough protection to the reinforcing steel in all concrete which is exposed to dampness, water or to the weather:

The following appeared under the caption of "Corrosion of Steel in Concrete," in Rock Products and Building Materials:

"Speaking on this subject some time ago, Dr. W. H. Walker, director of the research laboratory of applied chemistry of the Massachusetts Institute of Technology said that every engineer is well aware of the fact that acidulated water, no matter how small the percentage of acid may be, tends to corrode steel by increasing the number of hydrogen ions present.

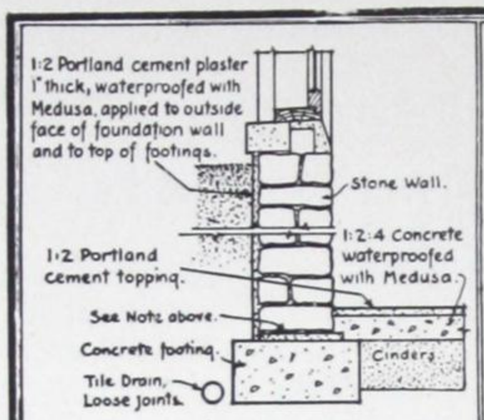
"It has been made clear, from tests he carried out, that there were certain alkaline substances present in concrete which corrected any acidity, and so protected the contained metal work from corrosion.

"This fact has an important bearing upon the question whether concrete will protect iron or steel from corrosion. Inasmuch as Portland cement, when it sets or hardens, liberates a quantity of caustic lime, which is a strong alkali, the answer to the question must be in the affirmative.

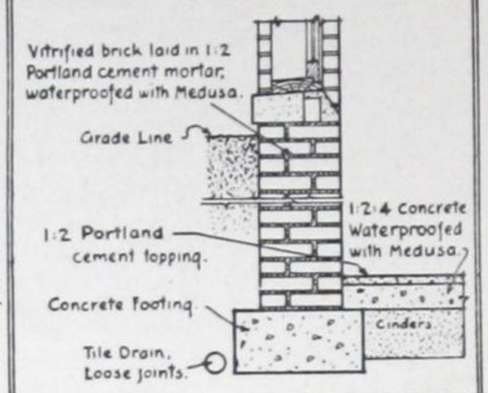
"Iron or steel will not corrode when embedded in good concrete. But caustic lime is soluble in water, and poorly made concrete is not impervious to moisture. Therefore, if iron be embedded in concrete through which water is allowed at any time to percolate, this calcium hydrate will be slowly but surely dissolved. With it will disappear the inhibiting action of the concrete; and iron embedded therein will, in time, rust and become corroded.

"To ensure absolute protection of the reinforcing members of concrete construction, therefore, such concrete must be of good quality and sufficiently dense and carefully made to render it *waterproof.*"

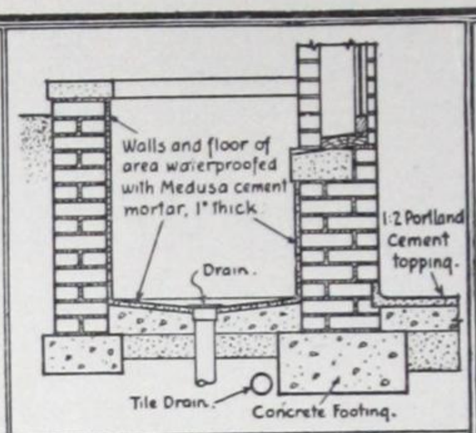
By destroying the absorptive properties of concrete, Medusa Waterproofing will effectively protect both the concrete and reinforcing.



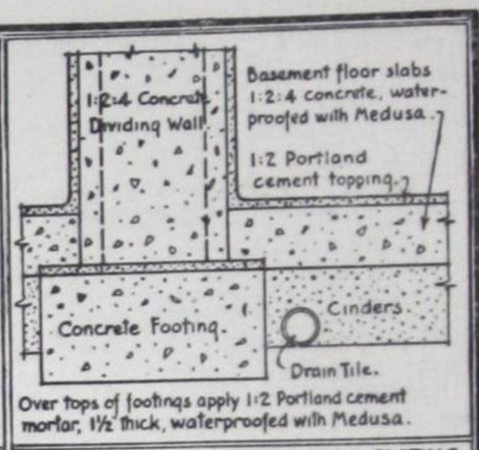
APPLIED TO BASEMENT WALL AND FLOOR.



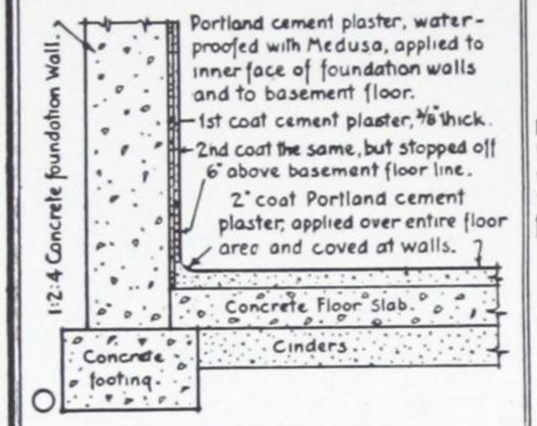
APPLIED TO VITRIFIED BRICK FOUNDATION.



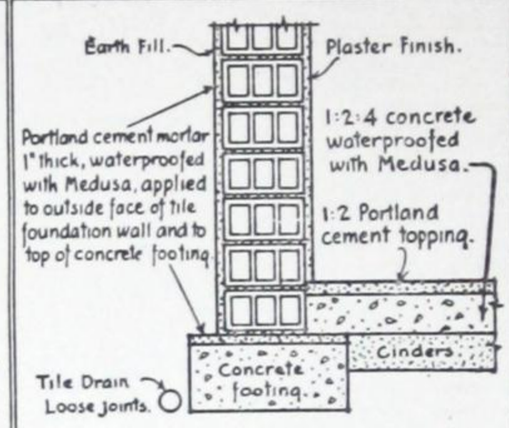
APPLIED TO BRICK AREA & FOUNDATION.



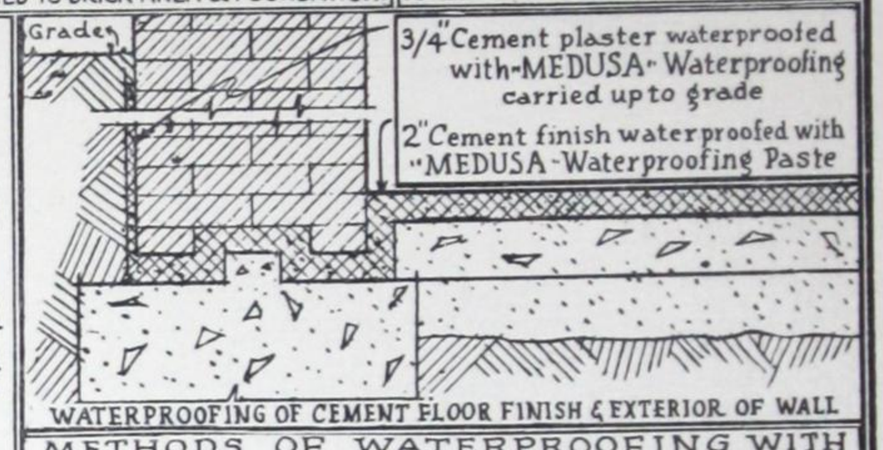
APPLIED TO CONCRETE FLOORS & FOOTING.



WATERPROOFING BY PLASTER COAT METHOD.

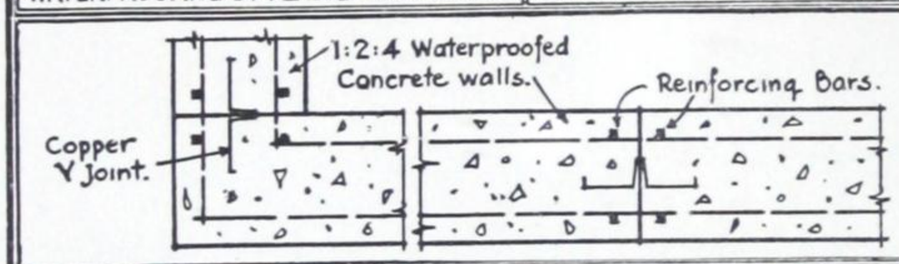


WATERPROOFING ON HOLLOW TILE WALL.

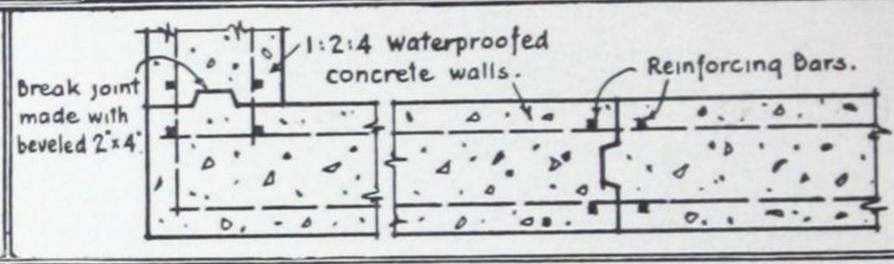


WATERPROOFING OF CEMENT FLOOR FINISH & EXTERIOR OF WALL

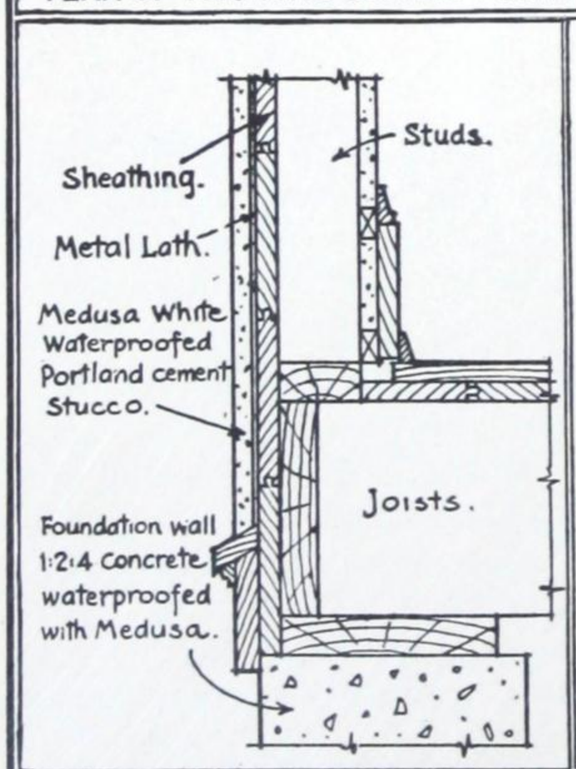
METHODS OF WATERPROOFING WITH "MEDUSA" WATERPROOFING

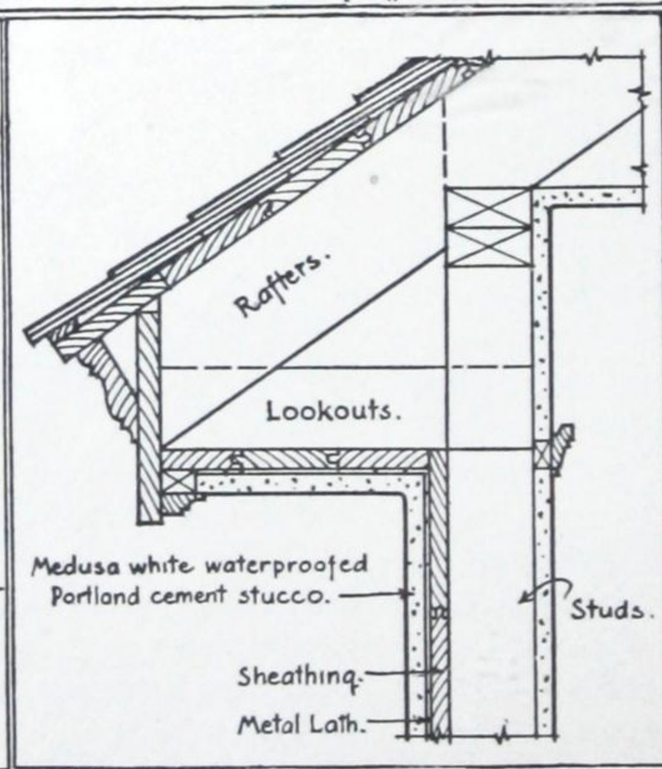


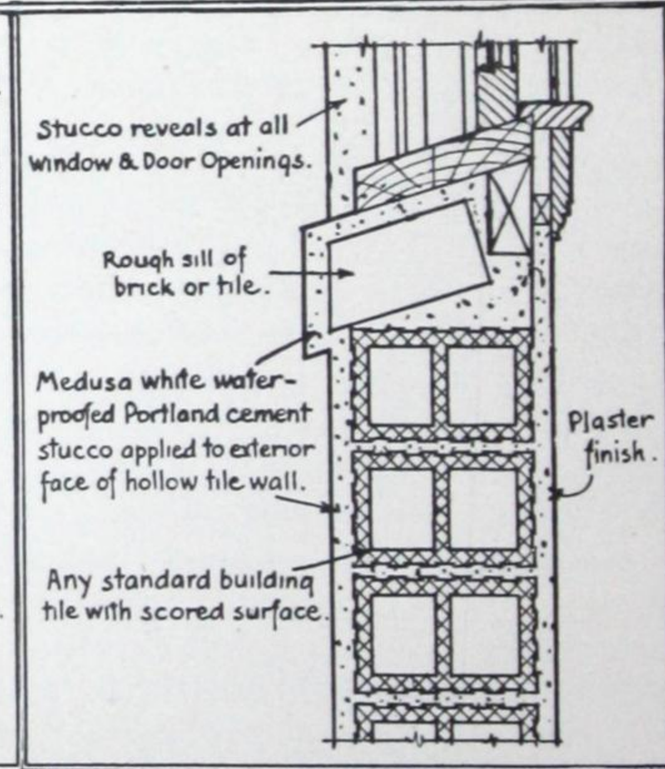
PLAN OF VERTICAL COPPER V JOINT BETWEEN POURINGS.

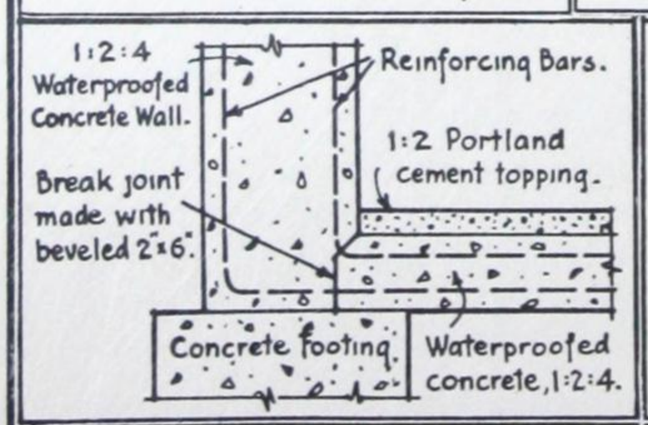


PLAN OF VERTICAL KEYED JOINT BETWEEN POURINGS.

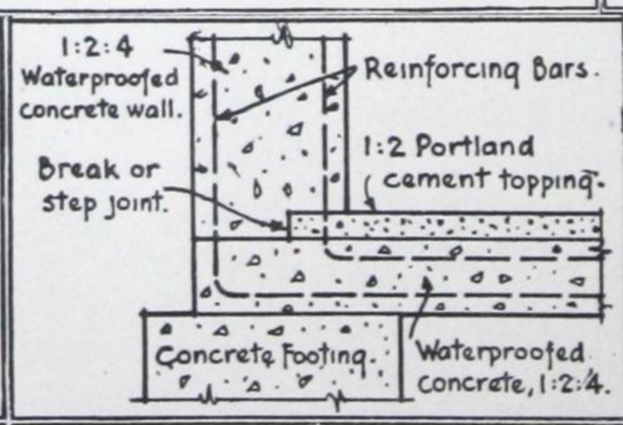




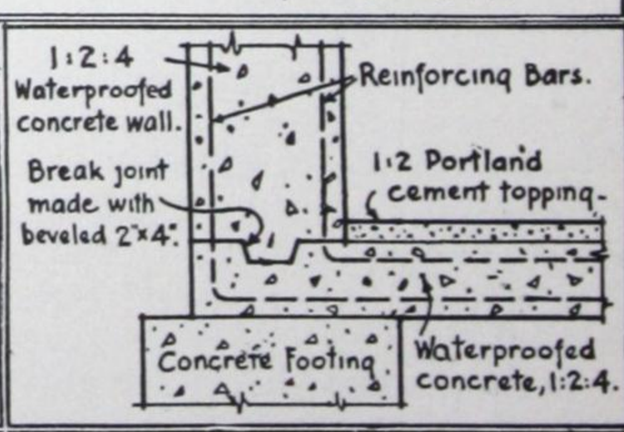




JOINT WHEN WALL IS POURED BEFORE FLOOR.



JOINT WHEN FLOOR IS POURED BEFORE WALL.



JOINT WHEN FLOOR IS POURED BEFORE WALL.

Waterproofed Concrete Floors

Quantities of materials required for 100 sq. ft. 1:2:4 (rammed concrete)

Assume 1 cu. yd. concrete takes:

1.51 bbls. cement; { 0.45 cu. yd. sand; / 12.15 cu. ft. sand; } and { .89 cu. yd. stone; / 24.03 cu. ft. stone. }

Inches thick	2	2½	3	3½	4	4½	5
Concrete cu. yds.	0.6175	0.7715	0.926	1.080	1.235	1.389	1.543
Cement bbls.	0.94	1.16	1.40	1.63	1.85	2.08	2.33
Sand cu. yds.	0.27	0.34	0.41	0.47	0.54	0.61	0.68
Sand cu. ft.	7.28	9.20	10.09	12.71	14.60	16.50	18.40
Stone cu. yds.	0.54	0.68	0.82	0.95	1.09	1.22	1.36
Stone cu. ft.	14.60	18.40	21.90	25.60	29.40	32.90	36.70
Medusa Wpfg., lbs.	8	9½	11½	13½	15½	17½	19½

Quantities of material required for 100 sq. ft. 1:2½:5 rammed concrete.

Assume 1 cu. yd. takes 1.24 bbls. cmt. { 0.46 cu. yd. sand; / 12.42 cu. ft. sand; } { 0.92 cu. yd. stone; / 28.84 cu. ft. stone. }

Inches thick	2	2½	3	3½	4	4½	5
Cement, bbls.	0.76	0.96	1.15	1.34	1.53	1.72	1.91
Sand, cu. yds.	0.28	0.36	0.43	0.50	0.57	0.64	0.71
Sand, cu. ft.	7.55	9.45	11.60	13.50	15.40	17.30	19.20
Stone, cu. yds.	0.57	0.72	0.86	1.00	1.14	1.28	1.42
Stone, cu. ft.	15.40	19.20	23.00	27.00	30.80	34.60	38.30
Medusa Wpfg., lbs.	6½	8	9½	11	13	14½	16

From Koehring Co.'s "Concrete"

Materials Required for 100 Square Feet *of Sidewalks and Floors for Varying Thickness of Course*

Concrete Base

Proportions	1:2:3				1:2:4				1:2½:5			
Thickness Inches	Cement Sacks	Sand cu. yd.	Stone cu. yd.	Medusa Wpfg. lbs.	Cement Sacks	Sand cu. yd.	Stone cu. yd.	Medusa Wpfg. lbs.	Cement Sacks	Sand cu. yd.	Stone cu. yd.	Medusa Wpfg. lbs.
2½	5.4	0.40	0.60	10.4	4.6	0.34	0.68	9.2	3.9	0.36	0.72	7.8
3	6.5	0.48	0.72	13.0	5.6	0.41	0.82	11.2	4.6	0.43	0.86	9.2
3½	7.5	0.56	0.84	15.0	6.5	0.48	0.96	13.0	5.4	0.50	1.00	10.8
4	8.6	0.64	0.95	17.2	7.4	0.55	1.10	14.8	6.2	0.57	1.14	12.4
4½	9.7	0.72	1.07	19.4	8.3	0.62	1.23	16.6	6.9	0.64	1.28	13.8
5	10.8	0.80	1.19	21.6	9.3	0.69	1.37	18.6	7.7	0.71	1.42	15.4
5½	11.8	0.88	1.31	23.6	10.2	0.76	1.50	20.4	8.5	0.78	1.57	17.0
6	12.9	0.96	1.43	25.8	11.1	0.82	1.64	22.2	9.2	0.86	1.72	18.4

Plaster and Floor Topping—Materials Required for 100 Square Feet of Surface for Varying Thickness

Proportions	1:1			1:2			1:2½			1:3		
Thickness Inches	Cement Sacks	Sand cu. yd.	Med. Wpfg. lbs.	Cement Sacks	Sand cu. yd.	Med. Wpfg. lbs.	Cement Sacks	Sand cu. yd.	Med. Wpfg. lbs.	Cement Sacks	Sand cu. yd.	Med. Wpfg. lbs.
3/8	2.2	0.08	4.4	1.5	0.11	3.0	1.3	0.12	2.6	1.1	0.13	2.2
1/2	3.0	0.11	6.0	2.0	0.15	4.0	1.7	0.16	3.4	1.5	0.17	3.0
3/4	4.5	0.16	9.0	2.9	0.22	5.8	2.5	0.23	5.0	2.2	0.25	4.4
1	6.0	0.22	12.0	3.9	0.29	7.8	3.3	0.31	6.6	3.0	0.33	6.0
1¼	7.5	0.27	15.0	4.9	0.36	9.8	4.2	0.39	8.4	3.7	0.41	7.4
1½	9.0	0.33	18.0	5.9	0.43	11.8	5.1	0.47	10.2	4.5	0.50	9.0
1¾	10.5	0.39	21.0	6.9	0.50	13.8	6.0	0.56	12.0	5.4	0.60	10.8
2	12.0	0.45	24.0	7.9	0.58	15.8	6.9	0.64	13.8	6.2	0.69	12.4

Hair is used in the scratch coat only in amount of ⅛ bushel to 1 sack of cement.
These figures may vary 10% in either direction due to the character of the sand.
No allowance is made for waste.

Cement Plaster or Cement Mortar

(With Ordinary Coarse Bank Sand)

Do not use leaner mixes than 1:2½ sand where waterproof plaster or mortar is required, or 1:3 for stucco.

Quantities of material required per 100 sq. ft., based on cement weighing 94 lbs. to the cu. ft.

Proportions	1 Cement		1 Sand		1 Cement		1½ Sand	
Inches thick	½	1	1½	2	½	1	1½	2
Packed Cement, bbls.	.75	1.51	2.26	3.01	.60	1.20	1.79	2.39
Loose Sand, cu. ft.	3.00	6.00	9.01	12.01	3.59	7.17	10.76	14.34
Medusa Waterproofing, lbs.	6	12	18	24	5	10	14	19

Proportions	1 Cement		2 Sand		1 Cement		2½ Sand	
Inches thick	½	1	1½	2	½	1	1½	2
Packed Cement, bbls.	.50	.99	1.49	1.98	.42	.85	1.27	1.69
Loose Sand, cu. ft.	3.96	7.92	11.88	15.84	4.21	8.42	12.63	16.84
Medusa Waterproofing, lbs.	4	8	12	16	3½	7	10	13½

Proportions	1 Cement		3 Sand	
Inches thick	½	1	1½	2
Packed Cement, bbls.	.37	.74	1.11	1.48
Loose Sand, cu. ft.	4.42	8.84	13.26	17.68
Medusa Waterproofing, lbs.	3	6	9	12

Medusa Waterproofing is used in proportion of 2% of weight of cement—equal to 2 lbs. Waterproofing to a sack, or 8 lbs. to the barrel of cement.

Stucco Work—Amounts of Cement and Sand Required

NOTE—The areas covered by one barrel of cement or one cubic yard of sand, as given below, are calculated for an average sand and without allowance for waste. In estimating, allowance must be made for waste. Openings are not deducted. When figuring for stucco, the loss of mortar, forming the keys for the first coat, should be taken into account.

Area Covered by 1 Barrel of Cement in Various Mixes

Mixture Parts by Volume		Thickness of Mortar Coat				
		¼ Inch	⅜ Inch	½ Inch	¾ Inch	1 Inch
Cement	Sand	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.
1	1½	336	226	168	112	84
1	2	404	270	202	135	101
1	2½	472	314	236	157	118
1	3	542	362	271	181	136

Area Covered by 1 Cubic Yard of Sand in Various Mixes

Mixture Parts by Volume		Thickness of Mortar Coat				
		¼ Inch	⅜ Inch	½ Inch	¾ Inch	1 Inch
Cement	Sand	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.
1	1½	1508	1006	754	503	377
1	2	1364	910	682	455	341
1	2½	1282	855	641	427	321
1	3	1222	815	611	407	306

A Cubic Yard of Rammed Concrete

Requires approximately the following quantities of cement, sand, gravel, or broken stone. Use Medusa Waterproofing to the amount of 2% by weight of the cement. Do not use a leaner mixture than 1:2:4 where waterproofed concrete is required.

Proportions	Cement			Sand		Gravel or Stone	
	bbls.	cu. yds.	cu. ft.	cu. yd.	cu. ft.	cu. yd.	cu. ft.
1:1:2	2.63	.39	10.52	.39	10.52	.78	21.04
1:1½:3	1.91	.28	7.64	.42	11.34	.85	22.95
1:2:4	1.51	.22	6.04	.45	12.15	.89	24.03
1:2½:5	1.24	.18	4.96	.46	12.42	.92	24.84

Using Taylor & Thompson's tables—Based on cement 3.8 cu. ft. per bbl. and crushed stone with 45% Voids-No Dust.

Volume of Rammed Concrete

Obtained from 1 barrel of 4 cubic feet of cement. (Eight pounds of Medusa Waterproofing are required for a barrel of cement for any of the following mixtures):

Proportions	Cement		Sand		Gravel or Stone		Concrete	
	cu. yd.	cu. ft.	cu. yd.	cu. ft.	cu. yd.	cu. ft.	cu. yd.	cu. ft.
1:1:2	.15	4	.15	4	.30	8	.38	10.37
1:1½:3	.15	4	.22	6	.44	12	.52	14.1
1:2:4	.15	4	.30	8	.59	16	.66	17.9
1:2½:5	.15	4	.37	10	.74	20	.81	21.8

Using Taylor & Thompson's tables.

Number of Square Feet of Wall Surface Covered Per Sack *of Cement, for Different Proportions and Varying Thickness of Plastering*

Proportions of Mixture	Materials				Total Thickness of Plaster				
	Sacks Cement	Cu. Ft. Sand	Medusa Wpfg. Lbs.	Bushels Hair*	½ in. Sq. Ft. Covered	¾ in. Sq. Ft. Covered	1 in. Sq. Ft. Covered	1¼ in. Sq. Ft. Covered	1½ in. Sq. Ft. Covered
1:1	1	1	8	⅛	33.0	22.0	16.5	13.2	11.0
1:1½	1	1½	8	⅛	42.0	28.0	21.0	16.0	14.0
1:2	1	2	8	⅛	50.4	33.6	25.2	20.1	16.8
1:2½	1	2½	8	⅛	59.4	39.6	29.7	23.7	19.8
1:3	1	3	8	⅛	67.8	45.2	33.9	27.1	21.6

*Used in scratch coat only.

NOTE: These figures are based on average conditions and may vary 10% either way, according to the quality of the sand used. No allowance is made for waste.

SECTION III

Some Typical Applications
of
Medusa Waterproofed Cement, and Medusa Waterproofing, in Commercial Construction

Photos by courtesy of the Baltimore & Ohio Railroad

The Washington Union Passenger Station

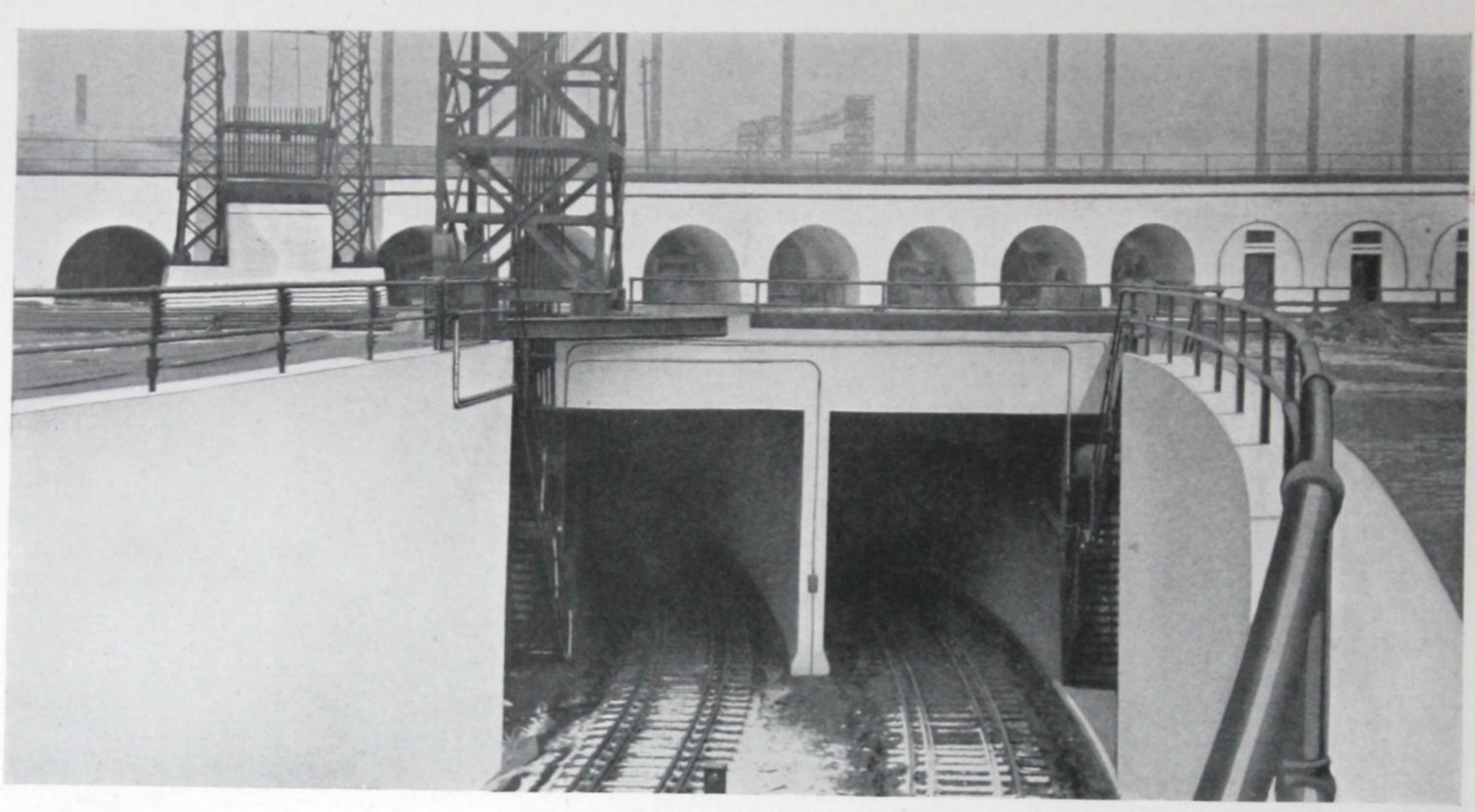
Through the noble portals of THE UNION PASSENGER STATION AT WASHINGTON there pass the world's great and the nation's elect. Keeping dampness out of the entire structure has been a doubly important consideration, and the use of Medusa Waterproofing has served as a logical step to that end. Messrs. D. H. Burnham & Co., Chicago, Architects; Thompson, Starret & Co., New York, General Contractors.

Union Station, Kansas City, Missouri

A perfect architectural creation of Bedford stone and gray granite on the exterior, and stone, marble and tile inside, the UNION STATION, KANSAS CITY, MISSOURI, is exceeded in size only by the great terminals in New York City. The main building is 150 feet wide and 510 feet long, costing about $6,000,000, while the total cost, including land, approaches, new belt line, etc., represents over $50,000,000. The train sheds covering the tracks, 30 feet below the waiting room floor, are 1,400 feet long.

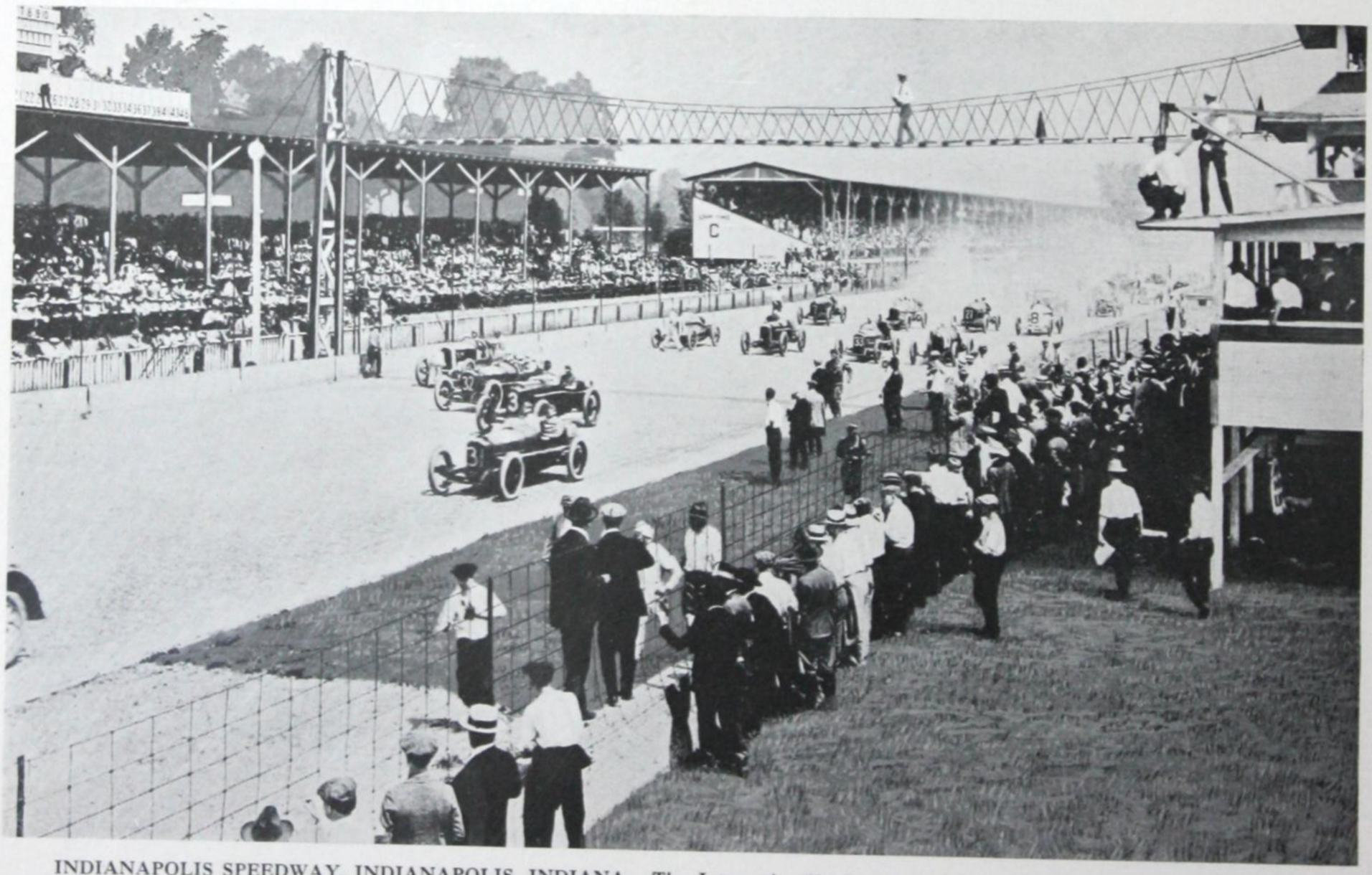
In the construction of the retaining wall south of the plaza in front of the station 15,000 pounds of Medusa Waterproofing were used. This wall faced up the natural rock formation where it was possible to use forms for the concrete on the outside face only. This rock was stratified and more or less water came down through the layers. Medusa Waterproofing was used by George A. Fuller Construction Company, Edgar S. Belden, Engineer in charge, and it has kept the water back and proved very satisfactory.

SEATTLE FIRE DEPARTMENT STATION, SEATTLE, WASHINGTON. An example of the permanently beautiful results obtainable in public buildings through the use of Medusa Waterproofed White Cement. The building was designed by the City Engineering department. E. V. Fallgreen, Plastering Contractor. Medusa Waterproofed White Cement furnished by Galbraith and Company, Seattle, Wash.

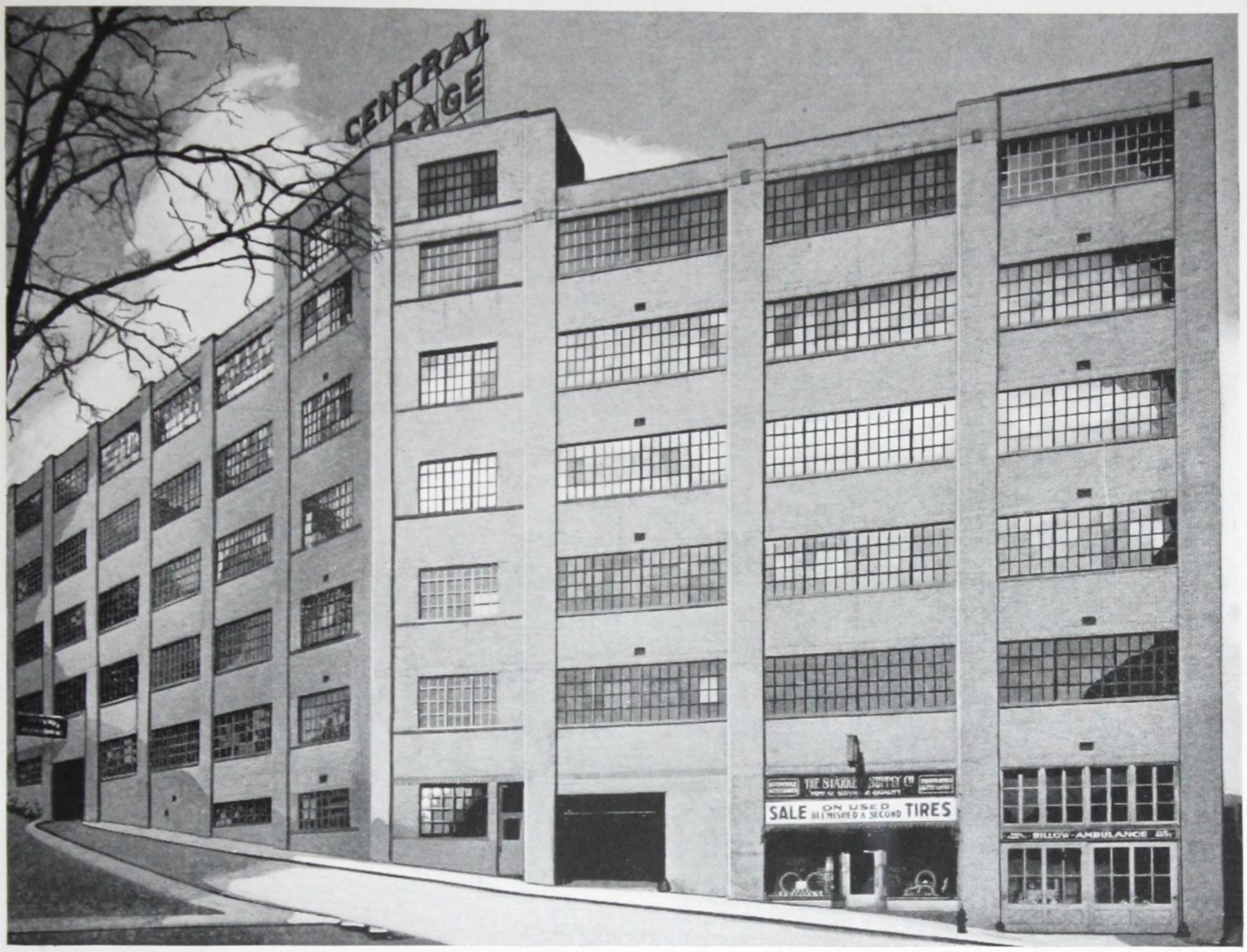


Inland Steel Co., Indiana Harbor, Ind.

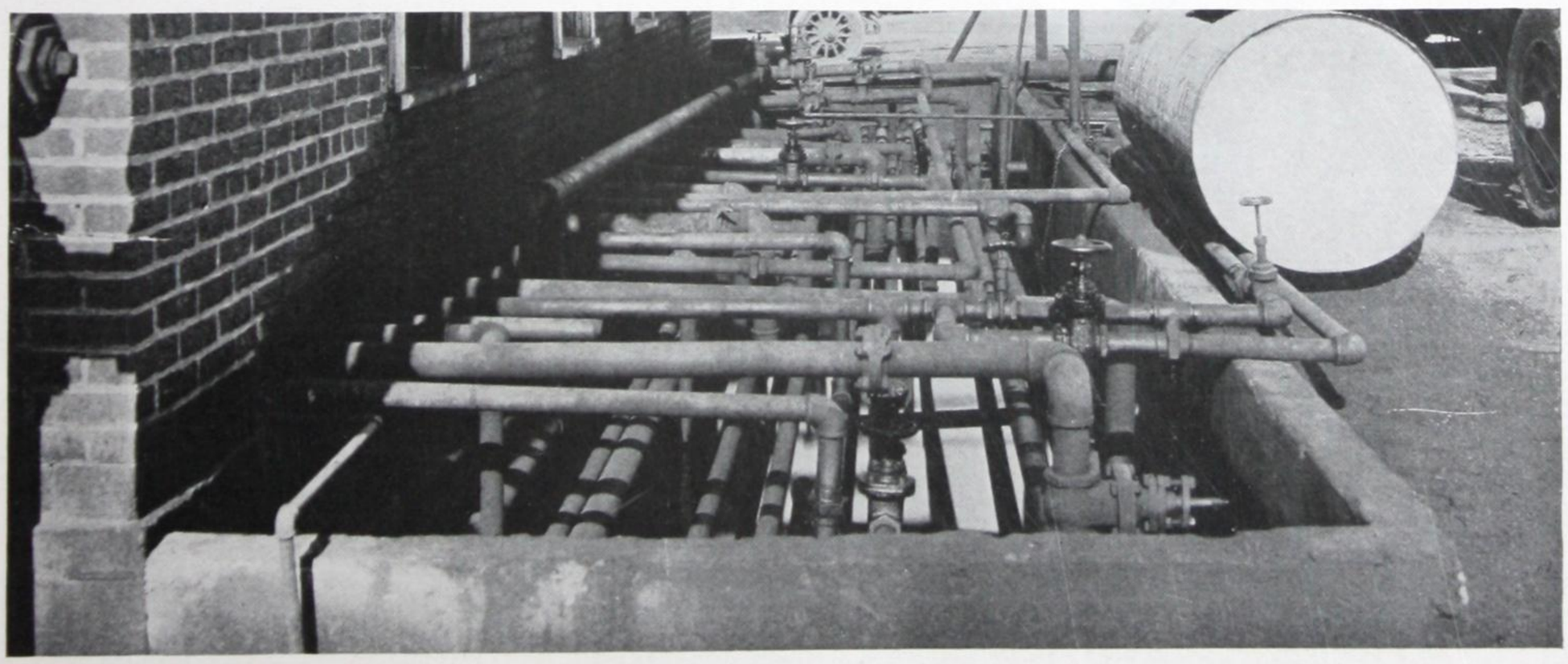
Entrance to tunnel more than 2,000 feet long, connecting the Company's Plants Nos. 1 and 2. The plants stand on the shore of Lake Michigan, and the tunnel itself is only about an eighth of a mile from the water front. Though it carries a head of water ranging from 12 to 16 feet, the concrete has remained entirely moisture-proof. Medusa Waterproofed Portland Cement was used by the Brownell Improvement Co., Chicago, General Contractors, in a 1.2 plaster coat over the walls and floors to secure these excellent results.



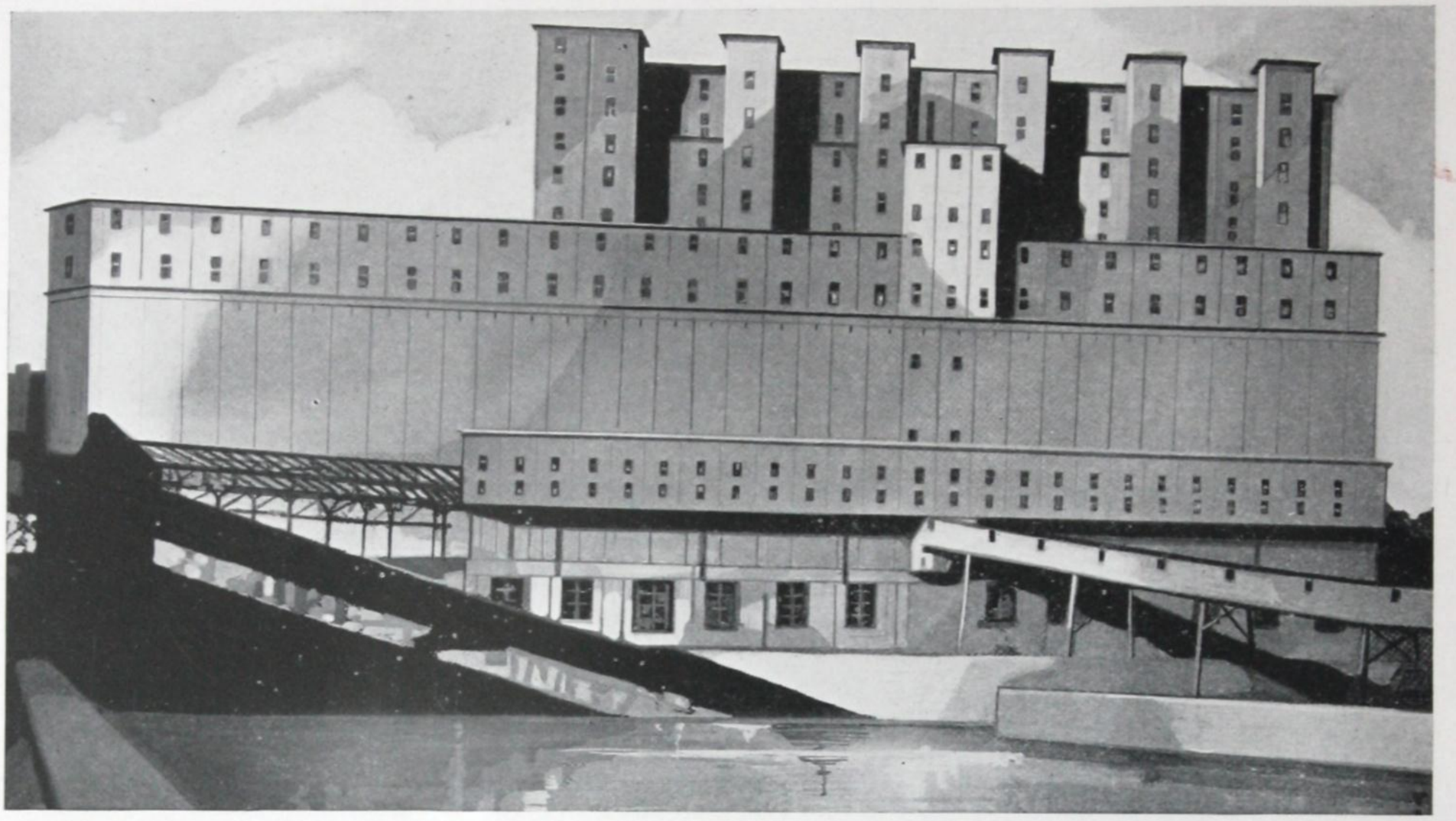
INDIANAPOLIS SPEEDWAY, INDIANAPOLIS, INDIANA. The Internationally famous speed course that springs into the limelight for a short day out of every year. The subways under the track offer the only way of getting across during the races. They are as dry and free from moisture as though they had been built for constant, daily use. The reason—Medusa Integral Waterproofing was used in all concrete entering into the construction of the subways.



CENTRAL GARAGE, AKRON, OHIO. Medusa Waterproofed Gray Cement was used in the construction of this very modern garage. A building that is as thoroughly waterproofed as it is fire-proofed. Carmichael Construction Co., Contractors.



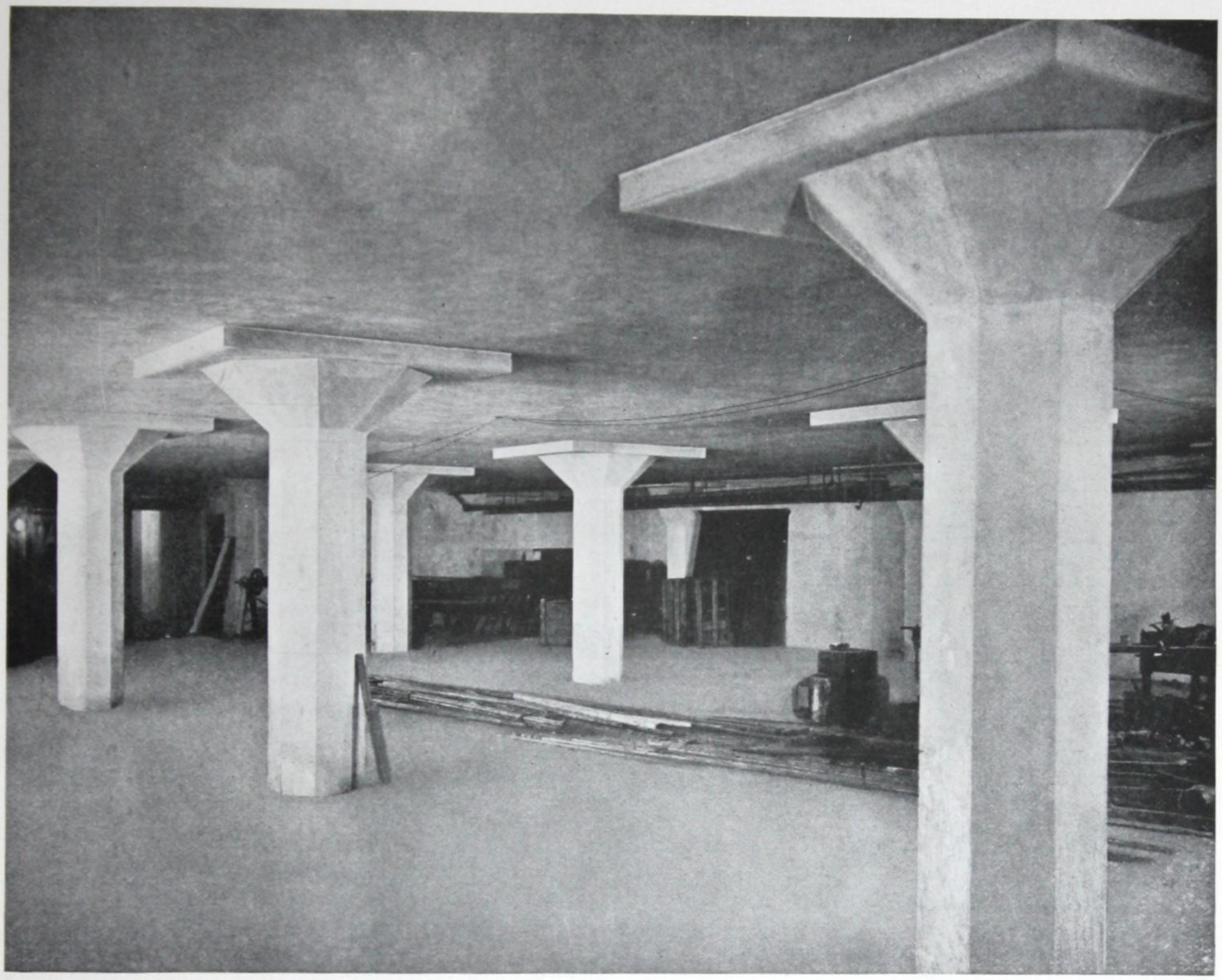
WESTERN REFINING CO., WICHITA, KANSAS—concrete tank to save accumulation of oil drippings. Medusa Waterproofing made this concrete tank thoroughly impervious to penetration by oil. The cost was nominal and was fully offset by the saving in oil for the first six months. Chas. Walden, Wichita, Contractor.



Harbor Commissioners' Grain Elevator No. 2, Montreal, Quebec

This is one of the largest reinforced concrete grain elevators in the world. The entire structure, including first story bins, is of concrete. Even in the cupola, the columns, beams, floors and roof are of this material, making it absolutely fireproof, and 30,000 lbs. of Medusa Waterproofing were used to make the work impervious to water and dampness. Messrs. John S. Metcalf Co., Limited, were the construction engineers.

RESIDENCE MR. FRED SHEARER, SEATTLE, WASH. Medusa Waterproofed White Cement used for outside stucco work, float finish, three coat work on metal lath. Architect, Mr. John Bennes, Seattle. McHalland Brothers, Contractors. Medusa products furnished by A. McMillan Company.



Basement, the Treleven Department Store Building, Fond du Lac, Wis.

Constantly exposed to water pressure—"Can strike match on walls inside" says Architect

In 1918, we received the following letter from Mr. H. T. Liebert, the Architect, for the above building:—

"The Treleven Building, Fond du Lac, Wisconsin, is a large reinforced concrete department store building; the basement is used for the grocery and meat departments.

"We used Medusa Waterproofed Cement in walls and basement floor, and I wish to state that the results obtained have been satisfactory beyond my expectation. Our basement floor is below the level of Lake Winnebago and also below the sewer line and the soil is clay constantly saturated with water below this lake level.

"We had very severe continuous rains during the summer and the water stood against walls to top of grade for about three weeks, which was a good test, and *we can strike a match on any portion of inside basement walls, as no moisture comes through them.* The owner and contractor are very much pleased with the results obtained, especially so since it was the general opinion in Fond du Lac that no one could get a dry basement in the city by going below the lake level. No doubt there will now be a great many more basements used for commercial purposes in Fond du Lac.

"On account of the results obtained in this building, I specified your Medusa Waterproofed Cement on the large wholesale grocery warehouse for Mr. C. E. Blodgett, Marshfield, Wisconsin. The owner informed me that he wanted an absolutely dry basement and I did not hesitate in specifying your materials.

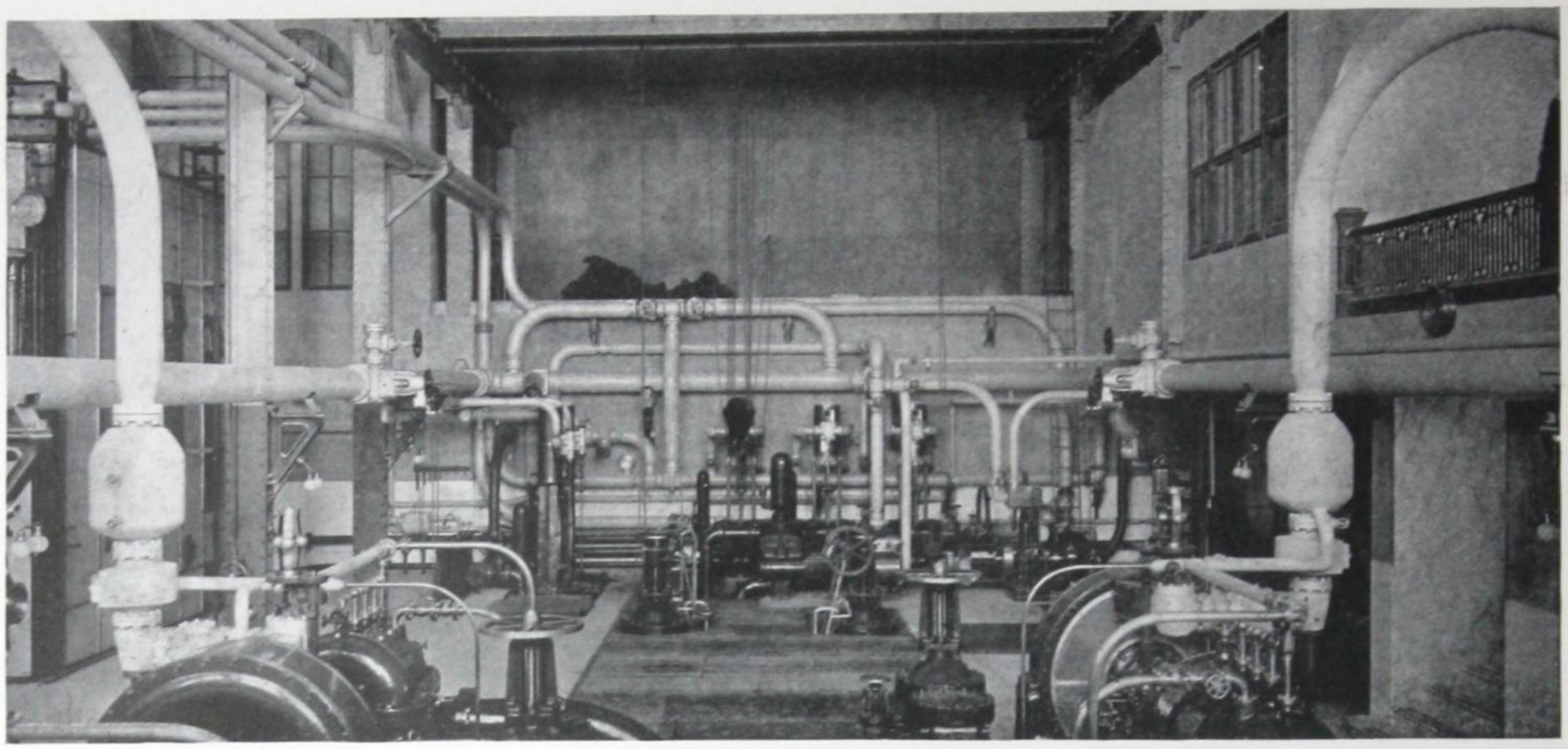
"Another point which pleases us very much is that the expense in waterproofiing with your Medusa Waterproofed Cement is very nominal

"Yours very truly,

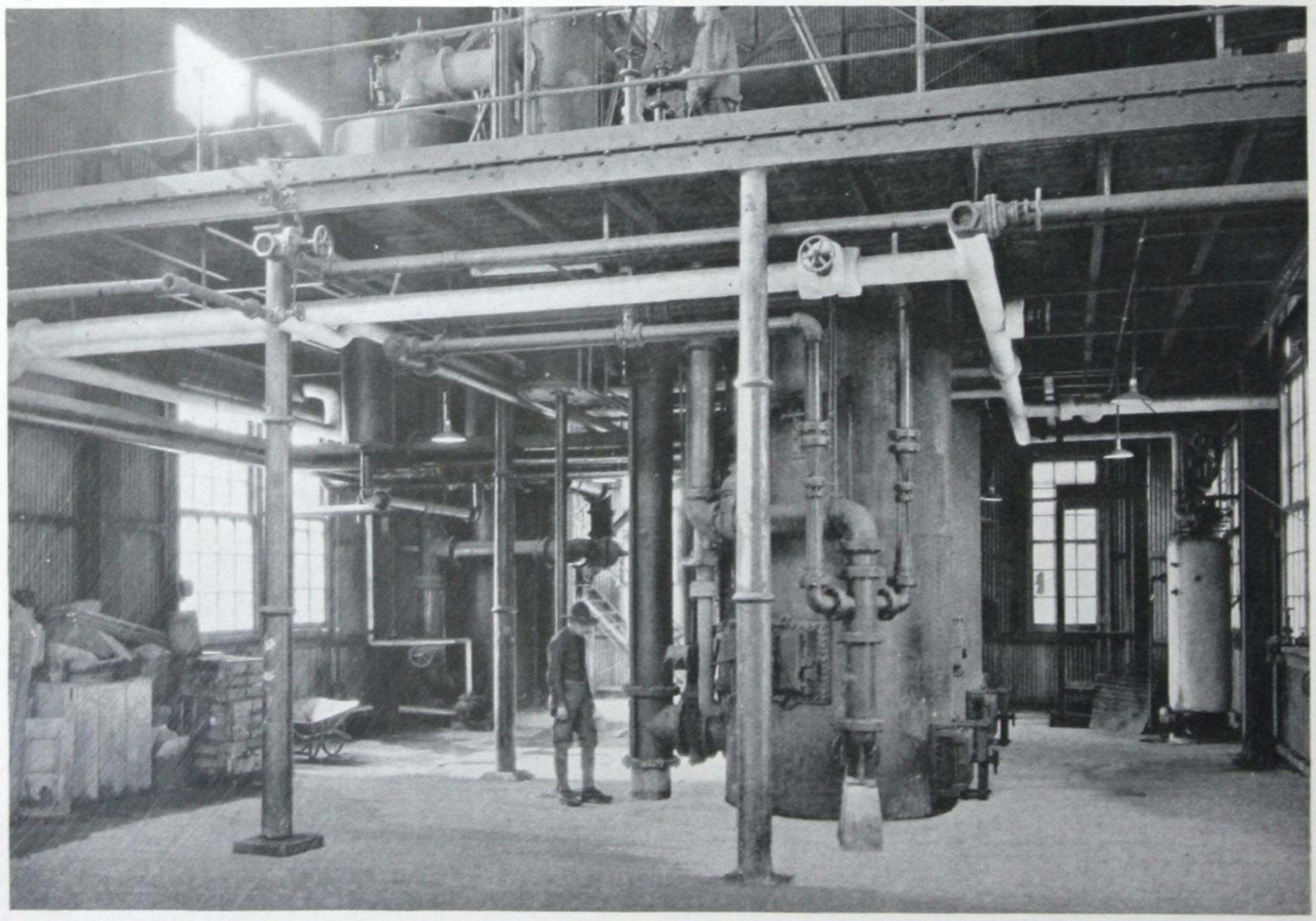
"H. T. LIEBERT, Architect."

Writing again in March, 1922, after the building had been in use for several years, Mr. Liebert adds:

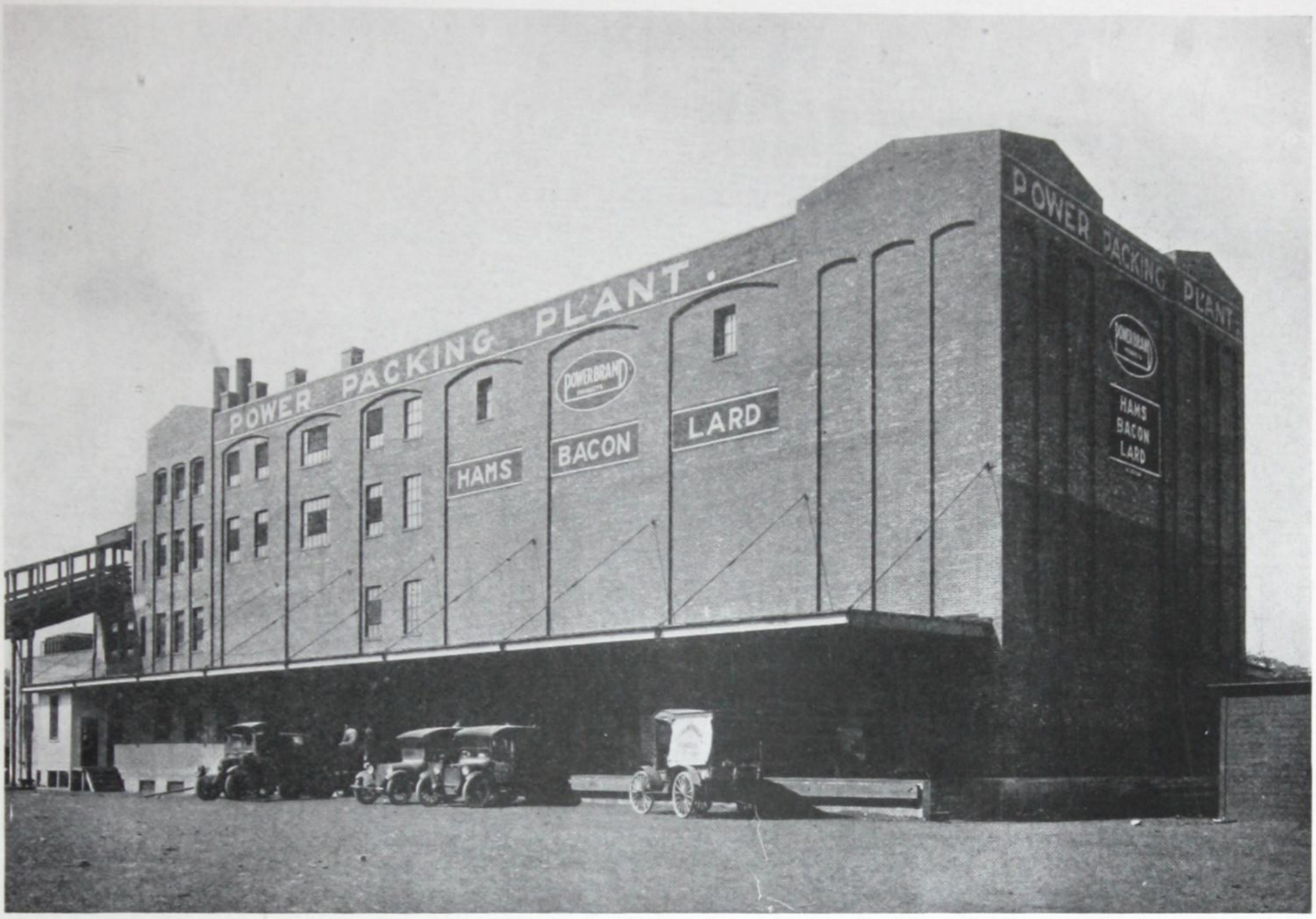
"The results are above my expectations. I expressed that opinion originally, and all I can add now is that the job is in as good shape as when I first wrote. The basement is still dry. I have carefully looked into this before writing you. Therefore the results obtained are *permanent.*"



MUNICIPAL PUMPING STATION, SAN FRANCISCO. Has been kept bone-dry with Medusa Waterproofing for twelve years. No sign of leakage around foundation or pump pits. The walls are also finished with Medusa Waterproofed White Cement. The Engineering Department of the City of San Francisco prepared the plans.

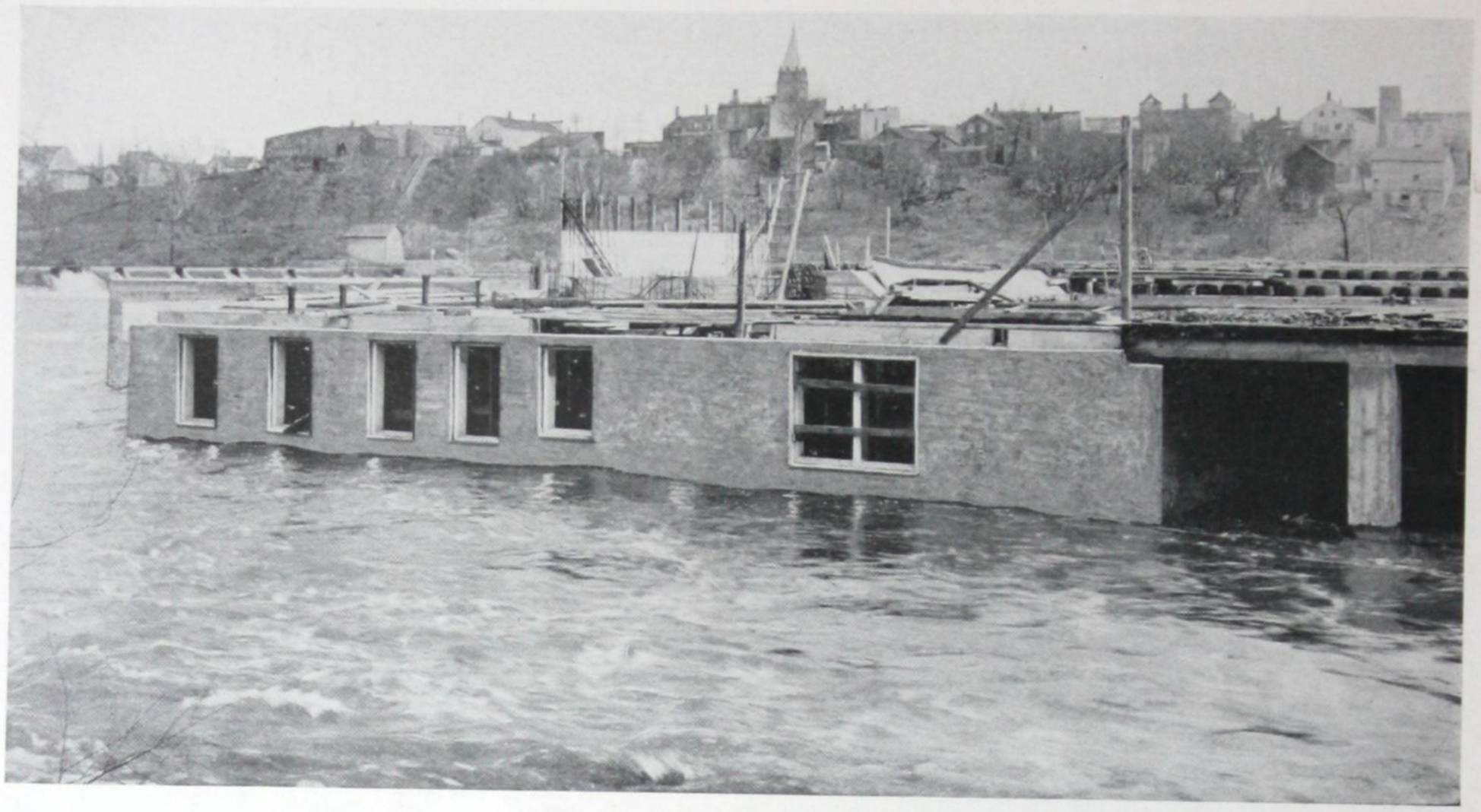


CARBONIC ACID PLANT, EDGEWOOD ARSENAL, EDGEWOOD, MD. The floors of this plant required that they be impervious to water and also to the more destructive acids manufactured. Medusa Waterproofing was used and the excellent condition of the floor proves how very successfully Medusa Waterproofing can meet the most exacting circumstances.



POWER PACKING COMPANY, NASHVILLE, TENN. Medusa Waterproofed Portland Cement used in construction of walls, floor and roof. The Packers' Architectural & Engineering Company, Chicago, Engineers. Contractor, Algernon Blair, Montgomery, Ala.

GISHOLT MACHINE CO., MADISON, WIS. Main Administration Building is shown in the center—portions of the plant are visible at the left and right. Medusa Waterproofing was specified by the Worden-Allen Co. and the Lackawanna Bridge Co., for concrete work in floors, underground passages between buildings, and other places through the plant. Mr. Harry Lafayette, Construction Engineer for the above interests, says: "I have been a constant user of Medusa Waterproofing for a period of ten years, and it has always given absolute satisfaction. Medusa Waterproofing, to my mind, is superior to anything on the market for waterproofing purposes. I have, in many cases, stopped leakage in elevator and scale pits, tunnels and basements, in some instances where they had been leaking for thirty years. We particularly recommend the use of Medusa when applid according to the manufacturer's directions, especially where high water pressure is encountered as in power dams, reservoirs, lake and river work."



Municipal Administration Building, Kaukauna, Wis.

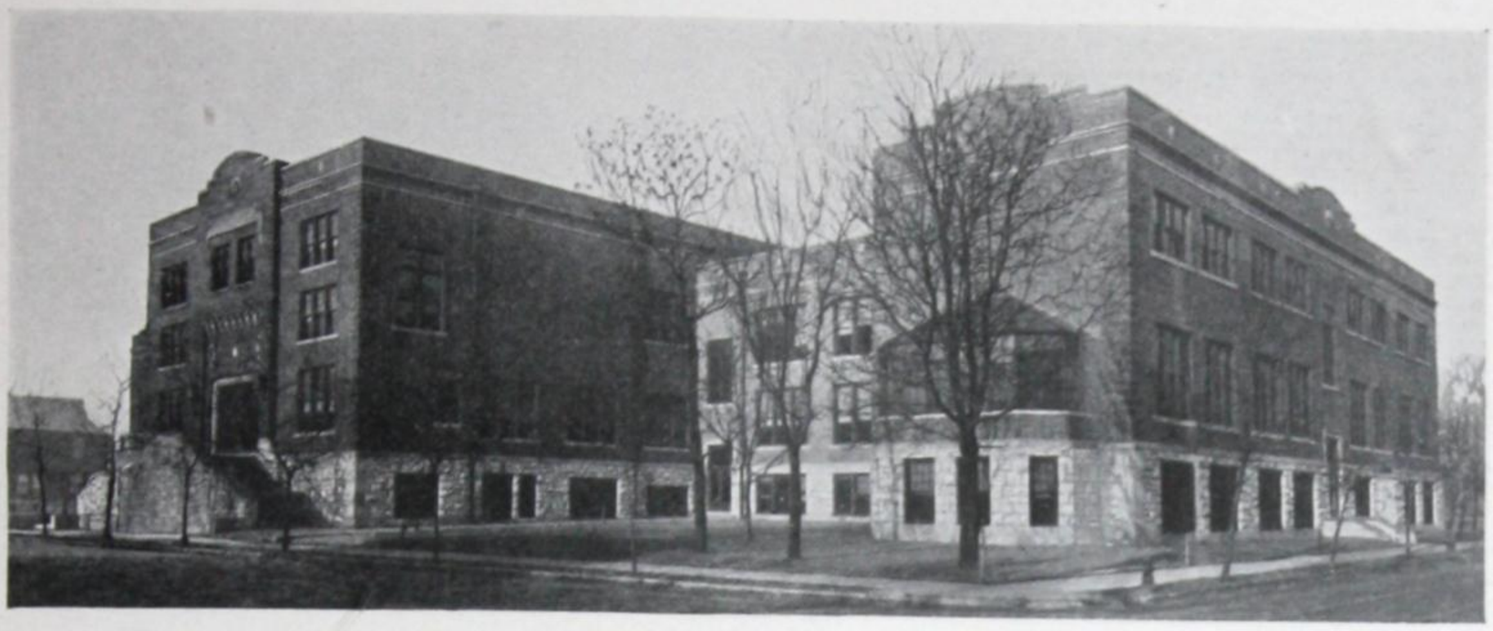
THE KAUKAUNA MUNICIPAL ADMINISTRATION BUILDING is located right on the banks of the famous Fox River, and is subject to an actual head of water 3 or 4 months of the year. Various city departments are housed on the upper floors; a school is located below. About 2,200 barrels of Medusa Waterproofed Gray Cement were used in the job, and the inside walls are surfaced with Medusa Cement Paint. Although many times exposed to heavy pressure, the walls have remained impervious to penetration by dampness. Mr. W E. Reynolds, Architect, Green Bay, Wis., John Coppes, Contractor, Kaukauna, Wis., Brenner & Grebe Fuel and Supply Co., Renn and Co., dealers supplying materials.

The Hanna Building, Cleveland

The foundation walls and basement floors of a great proportion of Cleveland's downtown office buildings are kept dry with Medusa Waterproofing. The Hanna Building is one of the finest examples of the way Medusa Waterproofing has given modern industry one of the things they must have—a dry basement. Medusa Waterproofing used in the retaining wall, footings and basement floors. Architect, Mr. Charles A. Platt, New York. Contractor, John Gill & Sons, Cleveland.

CASTLE & DOYLE, MADISON, WISCONSIN. 750 barrels of Medusa Portland Cement were used on this job. The coal pockets are of the monolithic type of construction. Medusa Waterproofed Cement used in the track hopper and pit.

CRANDALL TRANSFER & WAREHOUSE CO., MOLINE, ILL. When it comes to *permanently* satisfactory results in keeping dampness or actual standing water out of the underground work in a business or commercial structure, the wise builder puts his case up to Medusa Waterproofing and then forgets all about it. That is what the CRANDALL TRANSFER & WAREHOUSE CO., MOLINE, ILL., did—writing us some years after the work was completed, the owners say: "We used Medusa Waterproofing in the construction of the elevator pits in our new warehouse building, and it has proven very satisfactory."

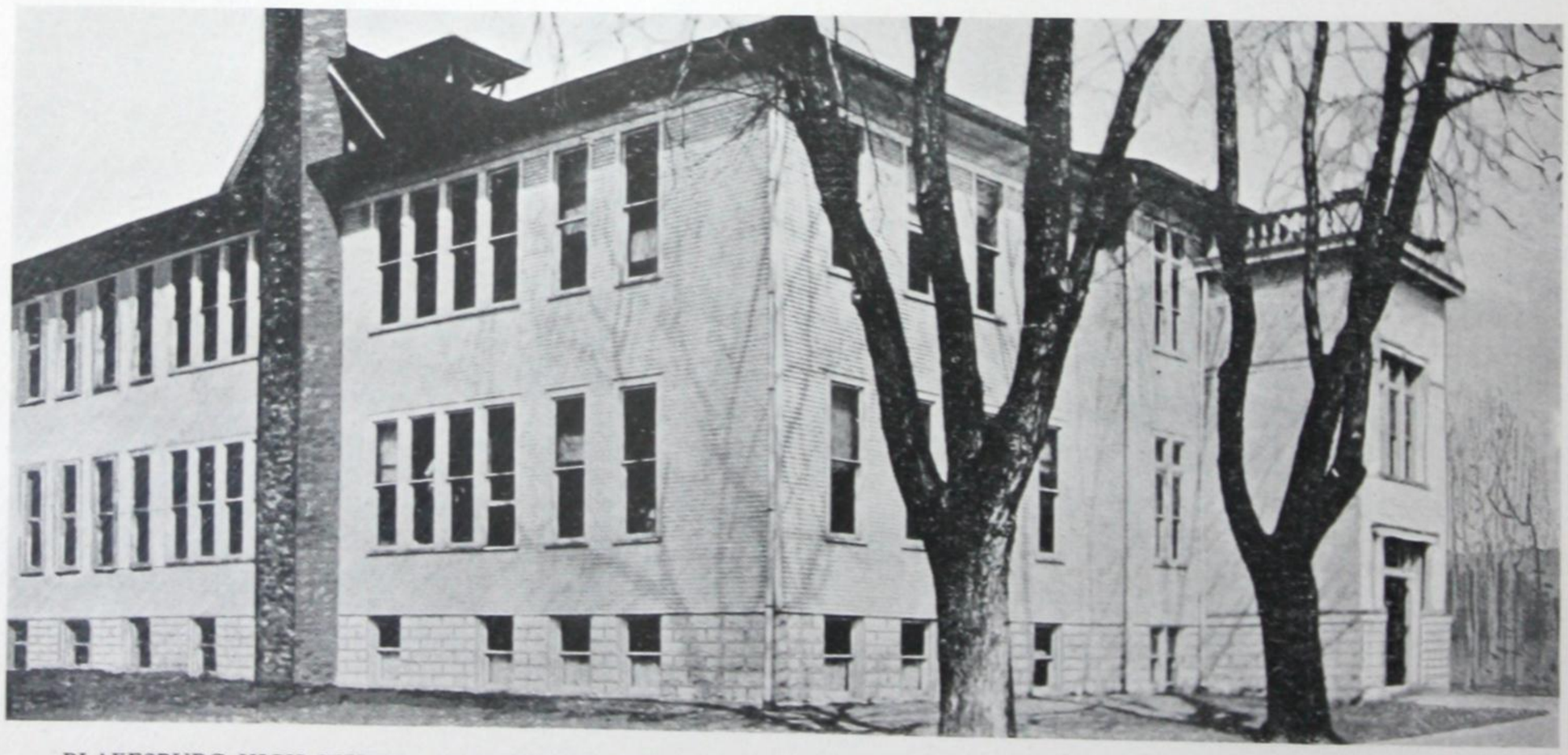


EAST ST. LOUIS HIGH SCHOOL, E. ST. LOUIS, ILLINOIS. The basement of this building is seven feet below sewer level. To secure a perfectly dry basement meant the use of some very excellent waterproofing material. Medusa Waterproofed Gray Cement was used with the result that the basement is perfectly dry. Results like these prove the effectiveness of Medusa Waterproofing where a constant water pressure is present. Reister and Ruback, Architects. Kellerman Contracting Company, General Contractors.

MOLINE TRUST & SAVINGS BANK BUILDING, MOLINE, ILLINOIS. Medusa Waterproofing used in foundation walls; all stone work set in Medusa White Cement Mortar. Messrs. Servin & Horn, Rock Island, Ill., Architects. Bergstedt Construction Co., General Contractors. Medusa Waterproofing supplied by Beder Wood's Sons Co., Moline.

SANITARY MAUSOLEUM COMPANY, READING, PA. A Mausoleum must of necessity be a permanent structure if it is to have any value. The Sanitary Company of Reading found that the one material for their use that would assure the permanence of their buildings against the one great enemy—water absorption, was Medusa Waterproofing. They now use it in all of their construction and report satisfaction.

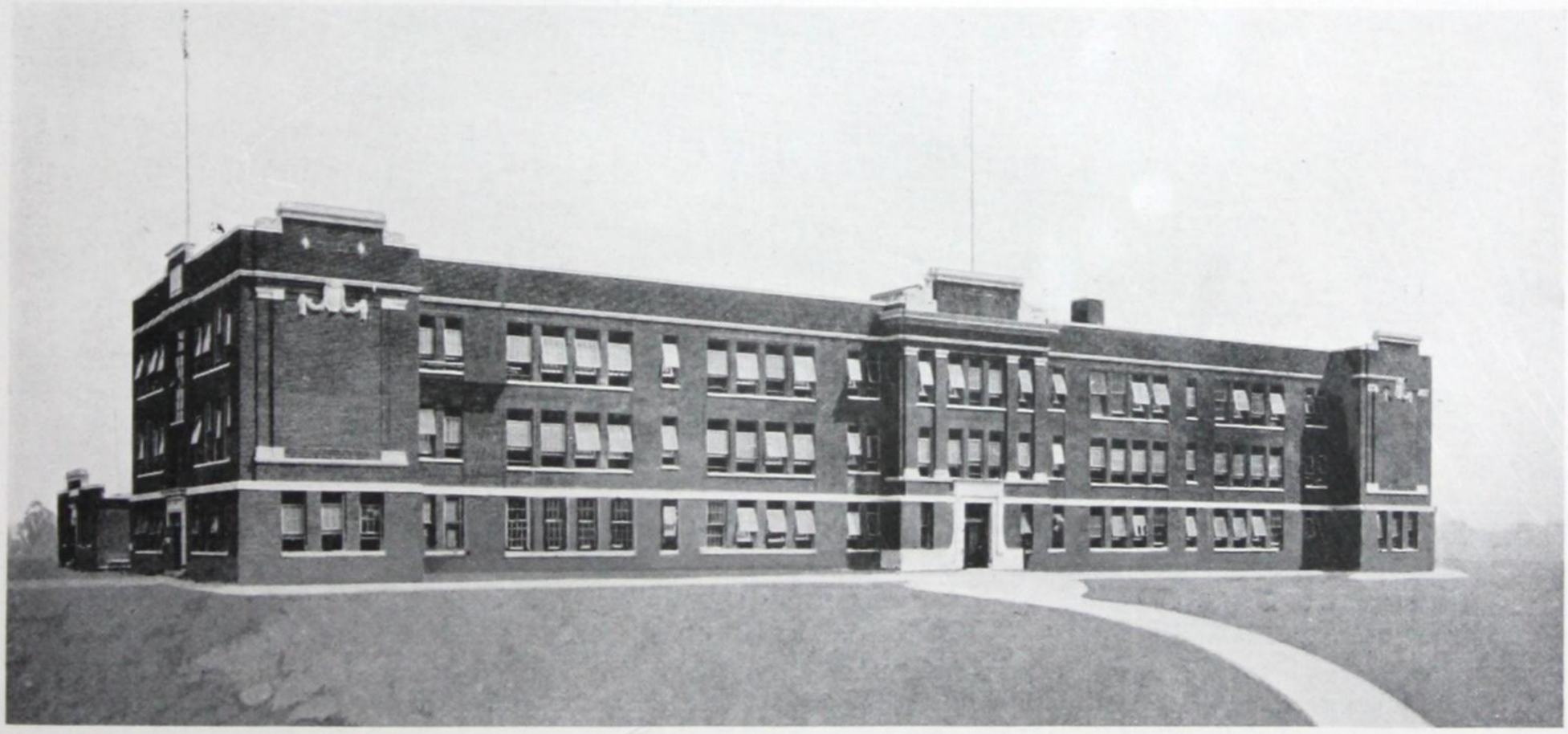
LIBERTY SCHOOL, REVERE, MASS. In excavating for this work, springs were encountered, which rendered the soil so soggy as to mire the teams. Medusa Waterproofing rendered the cement so impervious that, according to the Architects, no water has entered the basement since the building was completed. Materials supplied by Waldo Bros. & Bond Co., Boston. D. G. McDonald, Boston, Contractor; Messrs. MacNaughton & Robinson, Boston, Architects.



BLAKESBURG HIGH SCHOOL, BLAKESBURG, IOWA. Contractor John Huber, Jr., of Blakesburg, writes: "I am sending you photograph of Blakesburg High School Building. I had contract for basement, etc. The foundation from grade line upwards is of cement blocks. Basement walls are of concrete, plastered on inside with two coats of cement mortar, with which was mixed Medusa Waterproofing. This building stands in a very wet place, but inside of walls have never even been damp."

Mt. Sinai Hospital, Cleveland

Cleveland's finest hospital—Mt. Sinai, facing Wade Park and "Liberty Row" across 105th Street. The architectural style is that of the English Renaissance of the Georgian period. A wire-cut brick of general grayish pink, with unusually great variations of color, was selected, and was laid with a wide joint in old English bond, with black headers. A base of granite is surmounted by a ground floor treatment in Indiana limestone, above which are walls of brick trimmed with limestone on the first story of the main building, and terra cotta matching the limestone above this, and including the cornice and the trims of the other building. The underground concrete work is protected against dampness by Medusa Waterproofing. Messrs. Geo. B. Post & Sons, New York, were the Architects; The Reaugh Construction Co., Cleveland, Contractors.



"No. 76" School, Baltimore

The fact that Francis Scott Key School in Baltimore—officially known as "No. 76"—is located in rather low land, with a clay fill, gives Medusa Waterproofing all the better opportunity to render a real service, keeping the foundation walls and floors permanently free from moisture. The foundations are of brick, protected inside with portland cement plaster containing Medusa Waterproofing; the floor slabs are also waterproofed with the same material. Mr. Otto Simonson, Baltimore, was the Architect.

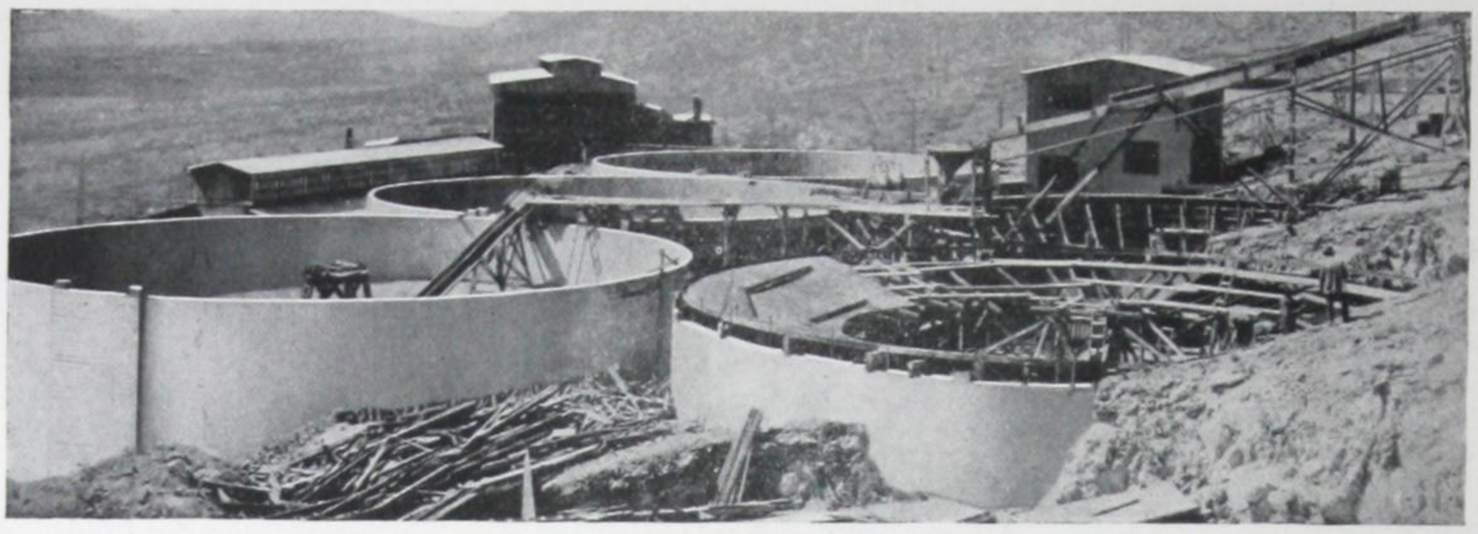
Halle Brothers' Company Department Store, Cleveland

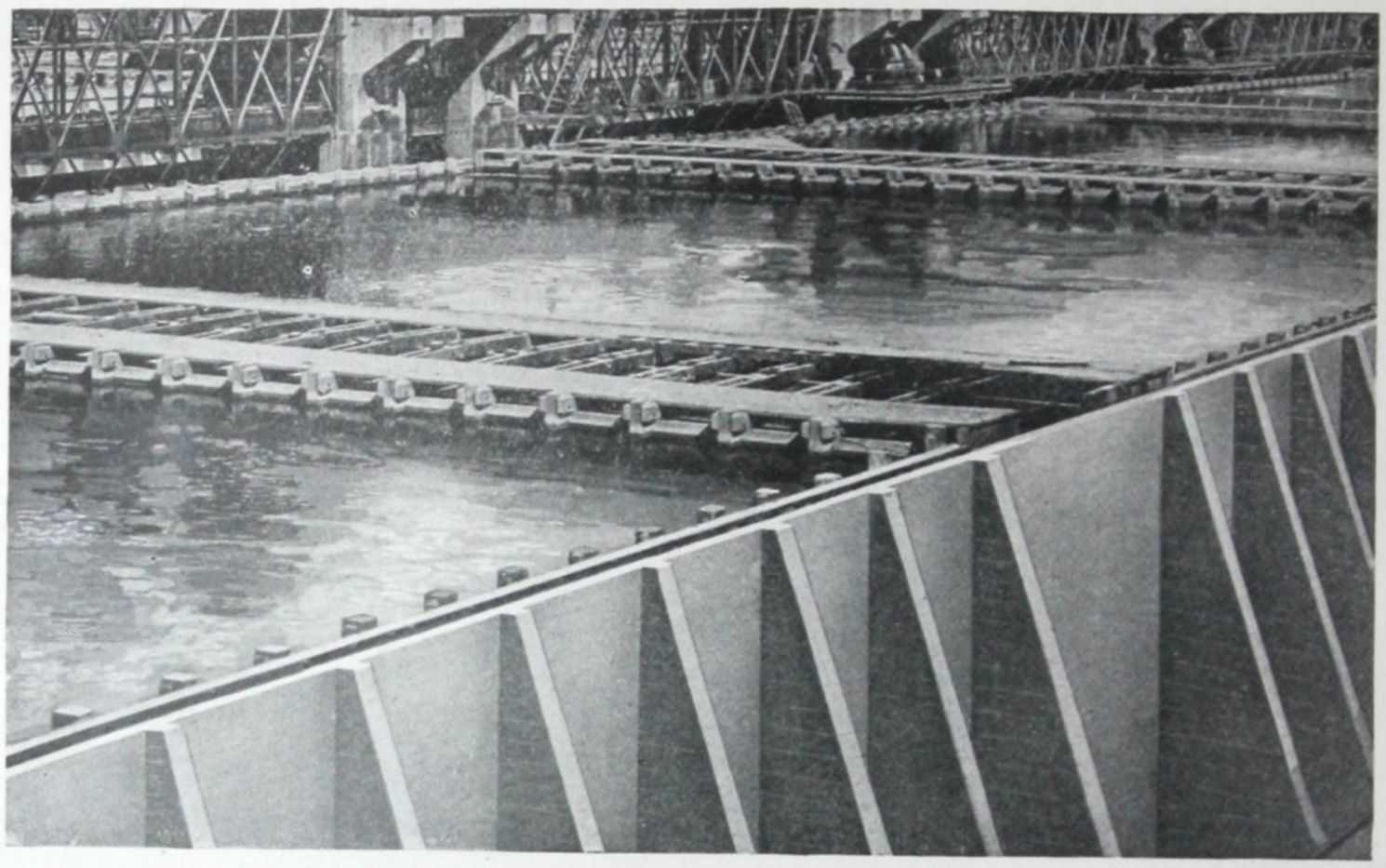
When the excavation for this building was first made, a treacherous stream of water was encountered twenty-eight feet below the sidewalk level. Work on the concrete foundation walls was continued only after the addition of 2% (by weight) of Medusa Integral Waterproofing. The absolute dryness, today, of the basement of Halle Brothers' store proves the very effective way Medusa Waterproofing sealed off the stream of water. Henry Bacon, Architect; Tidewater Building Company, Contractors, New York.

B. of L. E. Bank Building, Cleveland

In common with other large buildings in down-town Cleveland, the foundation footings extend into a very wet stratum, and the service of Medusa Waterproofed Cement in protecting the underground work permanently against seepage is therefore more than ordinarily important.

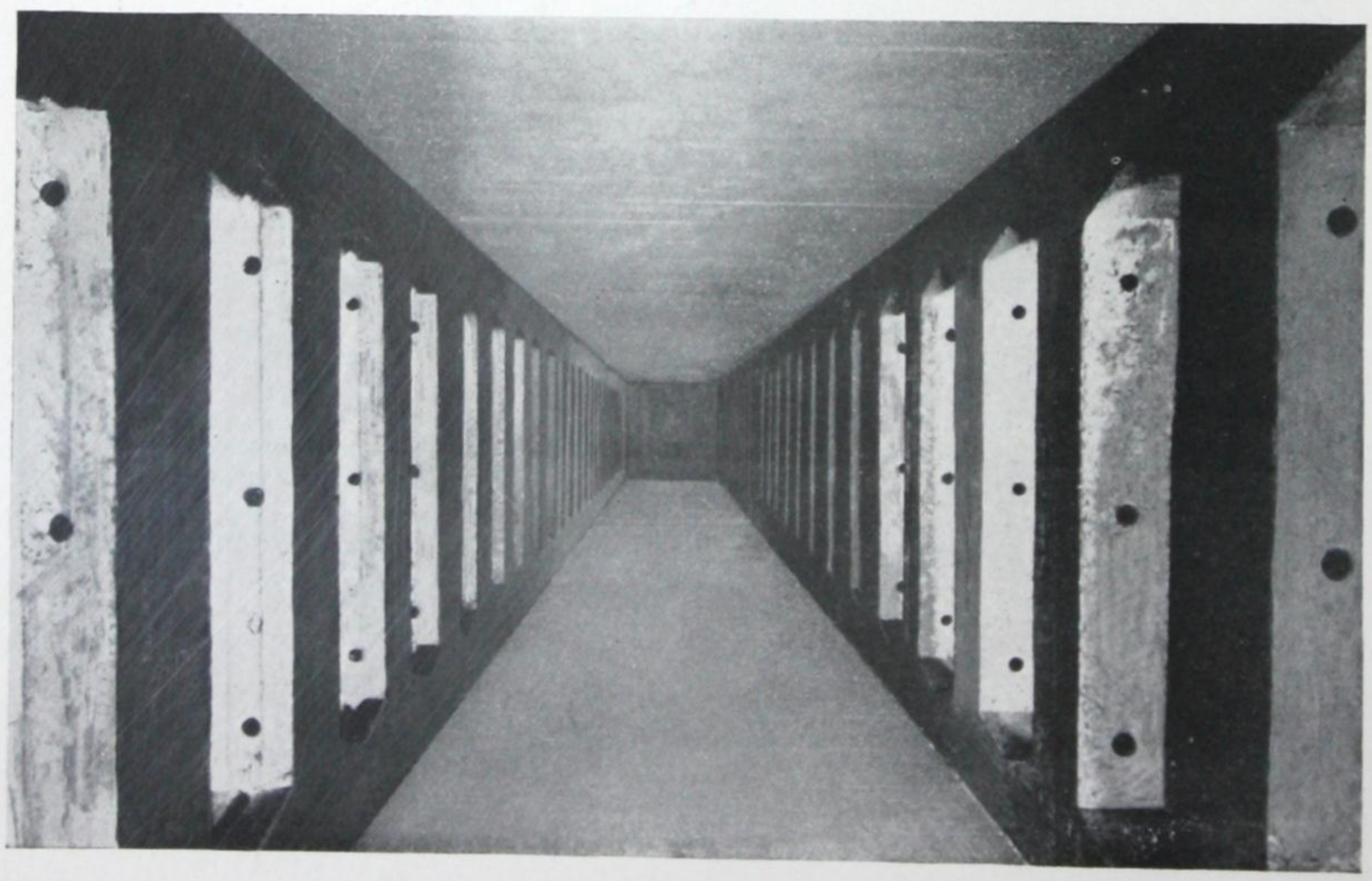
Messrs. Walker & Weeks of Cleveland were the Architects, and The Crowell-Lundoff-Little Company of Cleveland (now operating as Lundoff-Bicknell) were the General Contractors.





Tanks, Vats, Mine Shafts, Tunnels and other places around mining properties where cement is used have an added value in using Medusa Waterproofed Cement. Much saving in time and materials has been effected through the proper, intelligent application of Medusa Waterproofed Concrete.

Ask for our special Mining Bulletin.



First National Bank, Bridgeport, Connecticut

The foundation walls of this beautiful Bank Building are waterproofed with Medusa. A lasting guarantee that the beauty of this building will always be more than "skin deep."

Medusa Waterproofing was used in the walls for the safe deposit vault as well. The Bank's customers in their visits to the vault will never get the unwholesome impression of damp walls, or the musty odors of damp concrete.

Hotel Retlaw, Fond du Lac, Wis.

Medusa Waterproofed Cement had already gained many warm converts in Fond du Lac, as you have noted from the letter quoted on page 39; so, when it came to a question of the materials to be used in the new Hotel Retlaw in that city, "Medusa' representatives had plenty of local installations to use as reference.

Medusa Waterproofed Gray Cement was specified by the Architects, Messrs. Martin Tullgren & Sons of Milwaukee, and used by the General Contractors, The Immel Construction Co. of Fond du Lac, in the foundation walls and basement floors. The remarkable service that Medusa Waterproofing has rendered other owners in Fond du Lac, by keeping their buildings permanently dry, gives excellent grounds for the confidence that it will just as thoroughly preserve the underground work in Hotel Retlaw against dampness, as long as the structure stands.

Northland Hotel, Green Bay, Wisconsin

The foundation walls and basement floors of this new modern hotel building are made of Medusa Waterproofed Gray Cement.

A good dry basement is essential in any building, and in a hotel it has an added value, as it is often used for shops, restaurants, storage or other purposes.

The Northland Hotel will always have basement space that will be waterproof and dry as long as its walls stand.

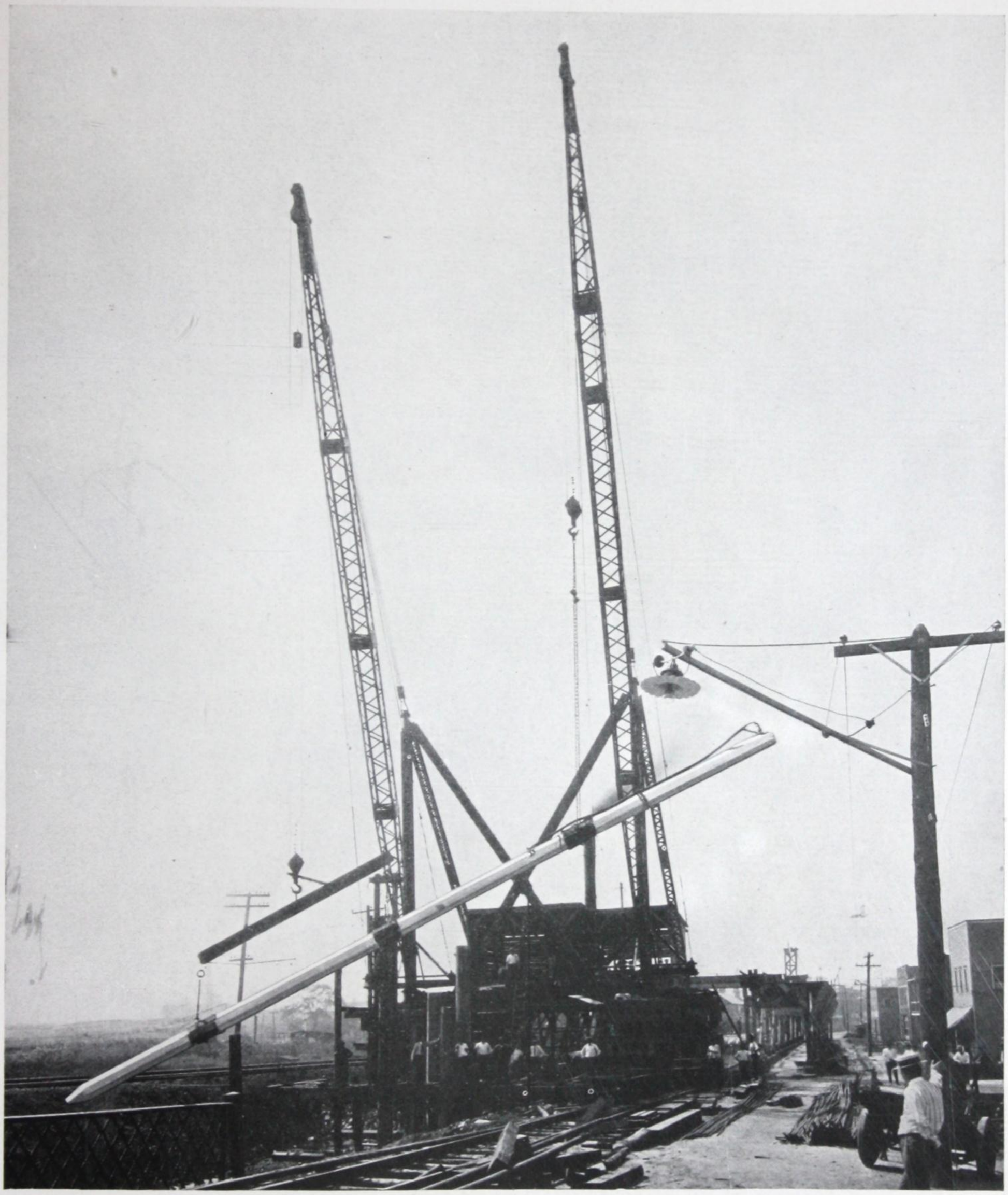
Messrs. Martin Tullgren and Sons, Architects, Milwaukee, Wisconsin. Cement work by Ludolph Hansen Construction Company, Green Bay, Wisconsin.

Pittsburgh Testing Laboratory Building, Pittsburgh

This famous authority on the testing of cement, concrete and other structural materials, has its headquarters in a handsome building in Pittsburgh, that stands on very wet ground. Although erected several years ago, the method worked out at the time for permanently protecting the structure against dampness has proved entirely satisfactory. In a letter just recently received from Mr. A. R. Ellis, General Manager, we are told:

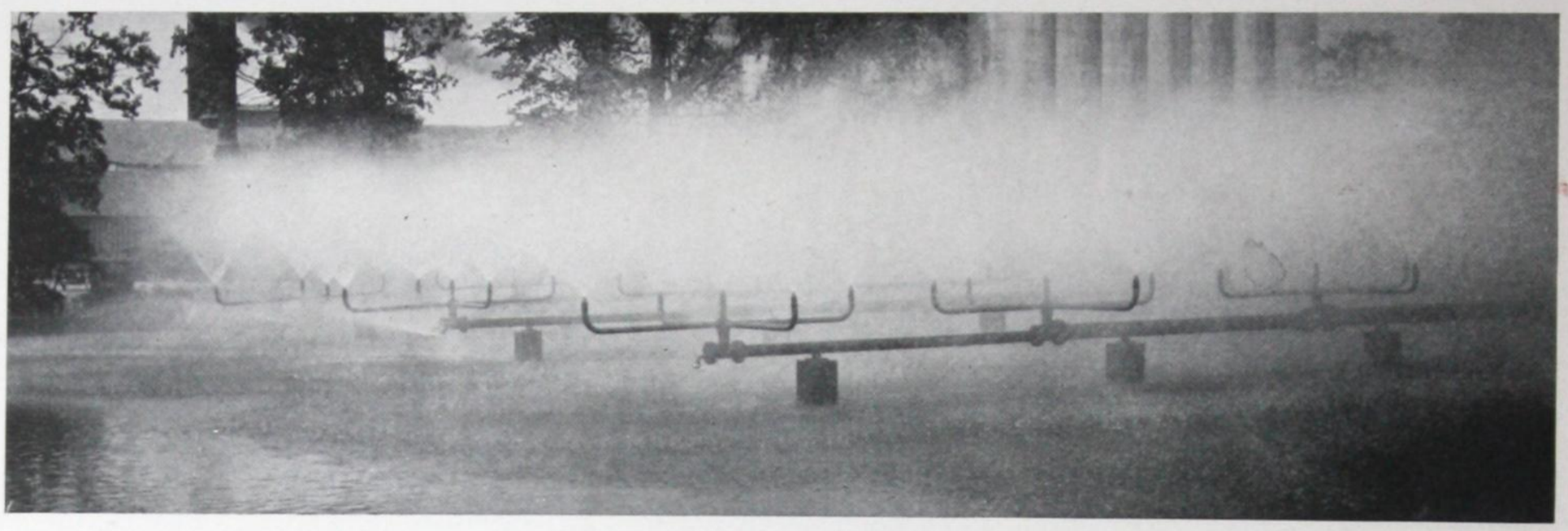
"We used Medusa Waterproofing in the basement of our building with very good success. There were several springs on the property which made it dfficult to keep the basement dry, and by a combination of drains and by the use of Medusa Waterproofing in the concrete, we effectually stopped the inflow of water."

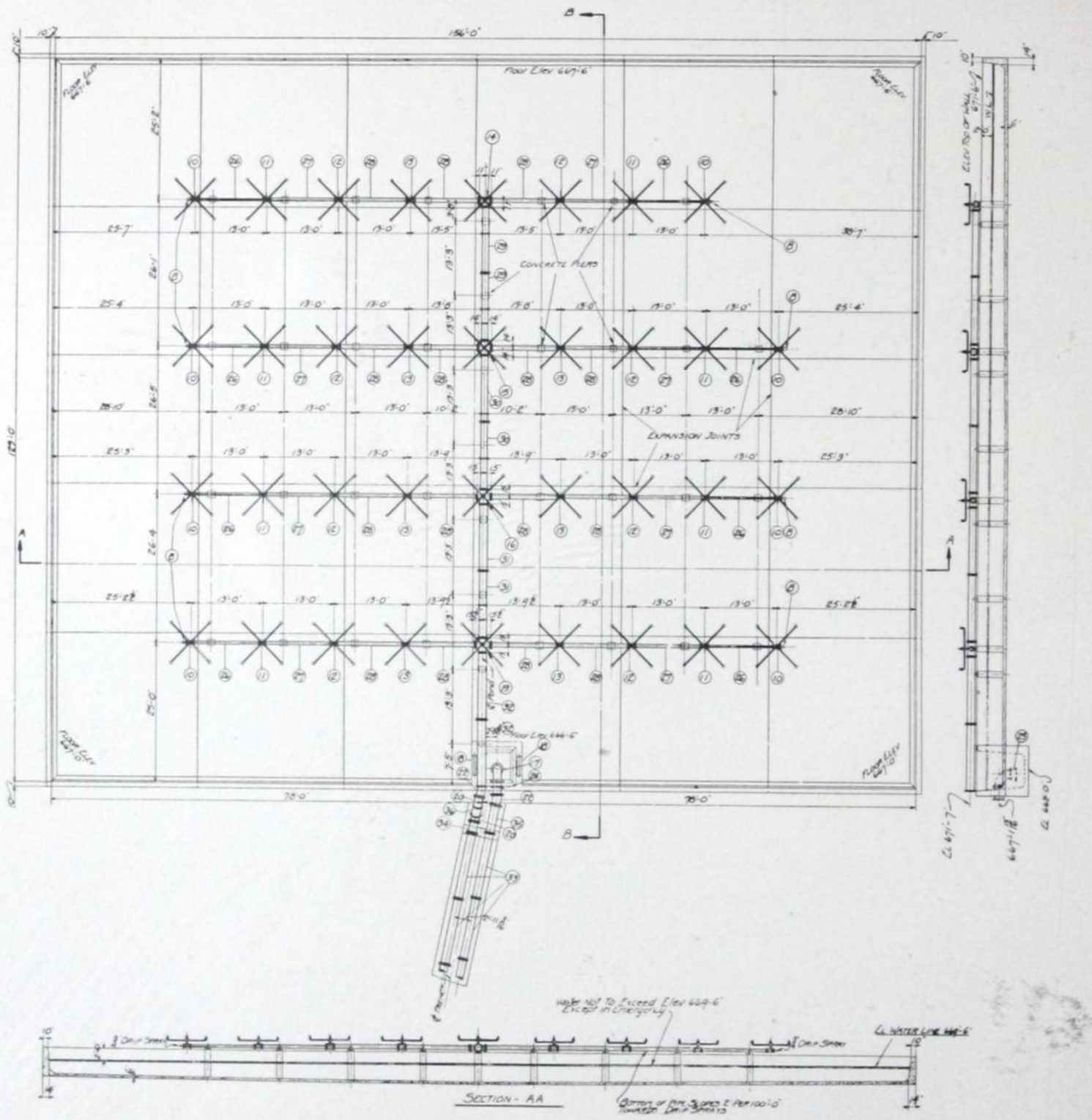
Mr. O. M. Tropp was the Architect, and James L. Stuart the Constructing Engineer.



Kenmore Boulevard Bridge, Akron, Ohio

Lowering Medusa Waterproofed Concrete piles into place on the Kenmore Bridge. The piles were cast, practically right on the job, by the construction company. The condition of the ground at the point is very soft, inclined to quick-sand and muck. In casting the piles a pipe was run down through the center of the mould. After placing, water was forced, under pressure, down the pipe in the center of the pile. The result was that the piling settled slowly into place without driving, until a substantial stratum was reached. Piles made with Medusa Waterproofing are not only impervious to water in the atmosphere, but they are also impervious to the constant presence of water in the soil in which they are placed. Piling of this kind can be really called permanent. The Wendell P. Brown Company, Cleveland, O., Engineers. The T. E. McShaffrey Construction Company, Akron, General Contractors.





490,000-Gallon Spray Pond at Silica, Ohio, Plant of The Sandusky Cement Company

From this pond is drawn the water used to condense the steam from turbines in the power-house. This water is discharged into the pond at the rate of 6500 gallons per minute, its temperature varying from 60 to 75 degrees. Spraying reduces its heat by perhaps 15 degrees or more.

The pond is constructed of Medusa Waterproofed Gray Cement; and although it was placed in cold weather, no cracks nor leaks have ever developed.

Orpheum Theatre Building, St. Louis, Mo.

Medusa Waterproofed Gray Cement was used in making the retaining wall and foundation for the Orpheum Theatre Building. Mr. Albert Lansberg, Architect, San Francisco. Murch Brothers Construction Company, General Contractors.

It is one of several big jobs in St. Louis where Medusa Waterproofed Gray Cement has been used with entire success. Medusa products for this job were furnished by the Glencoe Lime and Cement Company.

Some Representative Work in Which Medusa Products Have Been Successfully Used

ARKANSAS

State Capitol Building	Little Rock	

CALIFORNIA

San Mateo County Hospital	Beresford	
Mission High School	San Francisco	
Leiburn Courts	Long Beach	
City Hall	Dinuba	
Herbert Apartments	Long Beach	
Res. C. E. Kratz	San Francisco	
Res. J. M. Ruth	San Francisco	
Res. Raymond H. Bone	San Francisco	
9th Church of Christ, Scien.	San Francisco	
Olympic Club Building	San Francisco	
Municipal Pumping Station	San Francisco	Page 40
Ent. to St. Francis Wood	San Francisco	
Y. W. C. A.	Oakland	Page 91
Universal Film Co. Bldgs.	Universal City	
Austin Company	Los Angeles	Page 70
Moore Residence	Menlo	Page 71

CONNECTICUT

First National Bank	Bridgeport	Page 51
Reinforced Concrete Dock	Darien	
High School	Hartford	
Y. W. C. A.	Hartford	Page 93
Y. M. C. A.	Meriden	Page 90
City Hospital	New Britain	
Garden Pool	New Britain	
Parish House, First Baptist Church	New London	
Y. M. C. A.	New London	
Garden Pool	Simsbury	
Crosby High School	Waterbury	
Russell High School	Waterbury	
Y. M. C. A.	Norwich	
State College	Willimantic	
Oil Warehouse	Hartford	
Spencer Turbine Co.	Hartford	

DISTRICT OF COLUMBIA

Res. Joseph Beale	Washington	
Branch Offices, Chesapeake & Potomac Telephone Company:—		
1725 F. Street, N. W.	Washington	
1420 Colombia Road	Washington	
629 B. Street, N. W.	Washington	
725 13th St., N. W.	Washington	
Union Passenger Station	Washington	Page 34
United Bureau of Fisheries	Washington	Page 87
La Fayette Hotel	Washington	

FLORIDA

First Christian Science Ch.	Tampa	
Ornamental Pool, Estate Mr. Stanley Joyce	Miami	Page 83
John Bindley Estate	Cocoanut Grove	Page 87
Central National Bank Bldg.	St. Petersburg	
Arroyo Hotel	Daytona	Page 70

GEORGIA

Y. M. C. A.	Atlanta	

IDAHO

Res. Leo J. Falk	Boise	
Lewis-Clark Hotel	Lewiston	

ILLINOIS

Shot Tower, Equitable Powder Co.	East Alton	
High School Swimming Pools	Galesburg	
Soldiers & Sailors Home	Quincy	
Halbach-Schroeder Building	Quincy	

ILLINOIS

Otto Beier Bakery	Dixon	
Y. M. C. A.	Rock Island	
Y. M. C. A.	Moline	
Marquette Cement Manufacturing Company	La Salle	
Cudahy Packing Company	Chicago	
Municipal Pumping Station	East St. Louis	
Y. M. C. A.	Chicago	
Crandell Transfer & Warehouse Company	Moline	Page 44
Moline Trust & Savings Bk.	Moline	Page 45
High School	East St. Louis	Page 45
Pool, Estate of W. H. Titus	Glenco	Page 86
Swimming Pool Boy's Club	Rockford	Page 91
Robert M. Fair Building	Chicago	
Salvation Army Hut	Camp Grant, Rockford	
Rogers & Co. Building	Chicago	
Mausoleum	Decatur	
Res. Theodore Peterson	Rockford	
Res. Clarence A. Dewey	Rockford	
W. D. Shoupe Bungalow	Chicago Lawn	
Pool, Estate Louis Swift	Lake Forest	Page 81

INDIANA

Indiana Masonic Home, Scottish Rite Memorial	Franklin	
Burney School Building	Burney	
Indiana Epileptic Village	New Castle	
Shelby County Infirmary	Shelbyville	
Speedway	Indianapolis	Page 36
Inland Steel Co. Tunnel	Indiana Harbor	Page 36
Culver Military Acad'y Pool	Culver	Page 89
Swimming Pool	Logansport	Page 92
Grain Elevators	Dunkirk	
El Capistrano Apartments	Indianapolis	
General Electric Company Building No. 28	Ft. Wayne	
Biological Building	Zionsville	
Seventh Day Advent School	Cicero	
Res. Charles D. Finney	Indianapolis	
Res. Frank P. Summers	Indianapolis	
Central Court	Indianapolis	
Res. Samuel Fallender	Indianapolis	
Res. Dr. Eiteljorg	Indianapolis	
Res. Isaac Grogg	Auburn	
Res. Samuel Plumer	Terre Haute	
Res. C. E. Larrison	Pleasant View	
Res., Garage, Pool and Power Plant Dr. W. E. Bell	Terre Haute	

IOWA

Blakesburg High School	Blakesburg	Page 46
Basement, City Pump House	Estherville	
Serum Plant	Ft. Dodge	
Mead Flats	Cedar Rapids	
Vander Ven Park	Davenport	
Res. Al Bryan	Creston	
Res. A. F. Dawson	Davenport	
Farmers Elevator	Glidden	Page 20

KANSAS

Kansas Masonic Home	Wichita	
Western Refining Company	Wichita	Page 37
Masonic Temple	Topeka	Page 98

KENTUCKY

Y. M. C. A.	Covington	
Y. M. C. A.	Paris	

MAINE

Deering High School	Portland	
Res. Robert Payson	Cape Elizabeth	

MARYLAND

Francis Scott Key School	Baltimore	Page 47
Maryland Casualty Company, Main Building	Baltimore	
Carbonic Acid Plant, Edgewood Arsenal	Edgewood	Page 40

MASSACHUSETTS

Res. S. E. Bell	Leominster	
Highway Department Bldg.	Leominster	
Hopedale Community House	Hopedale	
Anastos Restaurant Building	Fitchburg	
"Eagle" Newspaper Building	Pittsfield	
Farrell Building	Pittsfield	
John Hancock Insurance Building	Boston	Page 78
Federal Reserve Bank	Boston	
Harvey Building	Boston	
New Chamber of Commerce Building	Boston	
Y. M. C. A.	Springfield	
Liberty School	Revere	Page 46
Birch Building	Fall River	
Home F. T. Blake	Worcester	
2,000,000 gallon Reservoir	Waltham	
Community House	Dalton	

MICHIGAN

Redford State Bank	Redford	
Colwell Garage	Detroit	
Masonic Temple	Highland Park	
Jefferson Hall Co. Building	Detroit	
Central Savings Bank	Detroit	
Chalmers Salesroom	Detroit	
Mich. School for the Deaf	Flint	
Mershon-Whittier Natator'm.	Saginaw	
Res. M. W. Sales	Grosse Point	
Natatorium	Saginaw	Page 87

MINNESOTA

Water Reservoir	New Ulm	Page 98

MISSOURI

Res. Dr. J. M. Fields	Kansas City	
Ford Sales & Service Station	Kansas City	
St. Louis Audit'm Swimming Pool, largest in the world	St. Louis	
Soulard Public Baths	St. Louis	Page 92
Union Station	Kansas City	Page 35
Dios Chemical Co.	St. Louis	
John T. Milliken & Co.	St. Louis	
Arcade Building	St. Louis	Page 18

NEBRASKA

Swimming Pool	Hastings	Page 88
Episcopal Church	Scottsbluff	
Farmers State Bank	Bayard	

NEW HAMPSHIRE

Baldwin Theater	Keene	
Exeter Grammar School	Exeter	

NEW JERSEY

Third Presbyterian Church	Newark	

NEW YORK

Telephone Buildings:—		
Broad St.	New York City	
30th St., 2nd and 3rd Ave.	New York City	
167th St. & Grand View Av.	New York City	
West 36th St.	New York City	
16th Ave. and 71st St.	Brooklyn	
14th Ave. and 41st St.	Brooklyn	
Milford St. & Liberty Ave.	Brooklyn	
Hunters Point	Long Island	
Res. V. E. Minich	Hartsdale	
Rapid Transit Tunnel	New York to Brooklyn	
Y. M. C. A.	New York	
Outdoor Pool, Estate Mr. Richard A. Roland	Rye	Page 84

NEW YORK (Continued)

Western Electric Building	New York City	Page 76
Brooklyn Edison Building	New York City	
Pool on Estate of Mr. B. G. Work, Oyster Bay	Long Island	Page 83
Bournehurst on the Canal, Cape Cod	Batavia	
New York City Postoffice	New York City	Page 78

OHIO

Central Garage	Akron	Page 37
City Park Municipal Bathing Pools	Toledo	Pages 94-96
Nela Park Reservoir	Cleveland	Page 88
Concrete Tank	Ironton	
First Unitarian Church	Toledo	
Power Plant	St. Marys	
Res. 515—21st St., N. W.	Canton	
First Trust and Savings Bk.	Canton	
Leader-News Building	Cleveland	
Halle Bros. Dept. Store	Cleveland	Page 48
B. of L. E. Bank Building	Cleveland	Page 49
Union National Bank Bldg.	Cleveland	
Res. Mrs. S. B. Newberry	Cleveland	
Outdoor Pool, Estate Mr. John E. Jones	Jackson	Page 84
Kenmore Boulevard Bridge	Akron	Page 55
Mt. Sinai Hospital	Cleveland	Page 47
Baldwin Piano Company	Cincinnati	
Res. Wm. H. Ortman	Dayton	Page 104
Hanna Building	Cleveland	Page 43
Bulkley Building	Cleveland	
1st Congregational Church	Mt. Vernon	
Residence Della S. Laird	Tiffin	
Residence R. D. Sneath	Tiffin	
Lang Body Co.	Cleveland	

OKLAHOMA

Waynoka State Bank	Waynoka	

PENNSYLVANIA

High School	Bellevue	
Dilworth Public School	Pittsburgh	
Pittsburgh Testing Laborat'y	Pittsburgh	Page 54
Y. M. C. A.	Erie	
City Hospital	Harrisburg	
Sanitary Mausoleum	Reading	Page 45

RHODE ISLAND

Y. M. C. A.	Providence	
Y. M. C. A.	Central Falls	
Res. Commodore Jones	Newport	
Pumping Stations and Disposal Plant	Warren	
Standard Wholesale Grocery Company	Newport	
Concrete Float, Government Landing	Newport	
Phipps Pool	Westbury	
Res. Frank U. Kennan	Providence	

TENNESSEE

Power Packing Company	Nashville	Page 41
Swimming Pool	Chattanooga	Page 86

TEXAS

National Biscuit Building	Houston	
Rice Hotel, Swimming Pool	Houston	
Price Theatre Building	Houston	

UTAH

Warm Springs Natatorium	Warm Springs	Page 85

VIRGINIA

Naval Swimming Pool	Norfolk	
Y. M. C. A.	Staunton	

WASHINGTON

Country Home Wm. Jones	American Lake	
Country Home J. L. Carman	Gravelly Lake	Page 71
Res. J. W. Codd	Spokane	
Res. J. C. Keller	Spokane	
Masonic Temple	Bremerton	
First Methodist Episcopal Church	Bremerton	
Keith Building	Bremerton	
Edmonds High School	Edmonds	
Gymnasium	Mt. Vernon	
High School	Mt. Vernon	
School Building	Seattle	
Roosevelt Grade School	Olympia	
Lincoln Grade School	Olympia	
Knights of Columbus Bldg.	Bremerton	
Fire Department Station	Seattle	Page 35
De Honey Dancing Academy	Seattle	

WEST VIRGINIA

Home John E. Reid	Wheeling	
Y. M. C. A.	Wheeling	Page 90

WISCONSIN

Y. M. C. A.	Eau Clair	
Cutler-Hammer Company Building	Milwaukee	
American Radiator Company, Building	Milwaukee	
Coal Conveyor	Beloit	
Treleven Building	Fond du Lac	Page 39

WISCONSIN (Continued)

Elks Club Pool	Kenosha	Page 89
Sessions Ice Cream Co.	Fond du Lac	
Hotel Retlaw	Fond du Lac	Page 52
Castle & Doyle, Coal Dealers	Madison	Page 44
Municipal Administration Building	Kaukauna	Page 42
Gisholt Machine Co. Main Administration Bldg.	Madison	Page 41
U. S. Glue Co.'s Reservoir	Carrollville	
Combined Locks Paper Company	Combined Locks	
Home of Mrs. F. W. Baker	Blanchardville	
Concrete Tank, Plankington Packing Company	Milwaukee	
Palace Theatre Building	Milwaukee	
C. E. Blodgette & Sons Warehouse	Marshfield	
Underwood Church	Milwaukee	
Res. A. J. Reeder	West Allis	
Northland Hotel	Green Bay	Page 53

CANADA

Fort Gary Hotel	Winnipeg	
Grain Elevators	Montreal	
Grand Trunk Pacific Hotel	Winnipeg	
Harbor Commissioners Elevator No. 2	Montreal, Que.	Page 38
Public Market	Montreal, Que.	

GOVERNMENTS

United States
English

Chicago, Ill., February 21, 1923.

A quantity of Medusa Waterproofing was used in machine pits, scale pit and elevator pit of the Combined Locks Paper Company's plant at Combined Locks, Wis. Your waterproofing has done everything that your literature stated it would do; all pits are water-tight.

We have used this material not only at the above mentioned plant, but also at the Gisholt Machine Company's Plant at Madison, Wis., and it has proved satisfactory. Whenever we have any waterproofing to be done we use Medusa Materials.

WORDEN-ALLEN COMPANY,
E. Williamson.

Oxford, Ind., August 18, 1918.

"I have been using Medusa Waterproofing for several years and consider it the only method to employ in making concrete burial vaults waterproof. I buried a vault, waterproofed with Medusa, and kept ground around it soaked with water for a month, after which it was opened and found to be perfectly dry. I have also used it in facing concrete blocks, and block buildings erected five years ago, dry off and blocks are of as uniform a color after a rain today as when built."

STEEN SWADLEY,
(Manfr. Concrete Burial Vaults and Cement Products)

Fall River, Mass., May 22, 1918.

"I used Medusa Waterproofing on basement of Birch Building, Fall River, which is below level of the river, and obtained excellent results."

EDWARD M. CORBETT,
Civil Engineering and Land Surveyor.

Chicago, Ill., October 30, 1918.

"We have used Medusa Waterproofing for more than eight years in more than five million cement blocks, and the fact that we are still using it surely shows our confidence and satisfaction."

CALUMET CONCRETE CONSTRUCTION CO.

Charlottesville, Va., October 15, 1918.

"In connection with your Medusa Waterproofing and Medusa White Portland Cement, it is almost impossible to say how many buildings we have used them in, but practically all we have erected, including post offices, court houses, city halls, hospitals, and large commercial buildings. This applies particularly to federal work, of which we make a specialty. In no single instance have the architects, owners, or ourselves been able to find fault with your cement or waterproofing. We consider them in a class by themselves, and while there may be others, to our personal knowledge we know of none that compares with them."

KING LUMBER CO.,
(General Contractors and Builders.)

Houston, Texas, April 23, 1918.

"Relative to Medusa Waterproofing, you are advised that this company has used a great deal of this material with good success. We used it for waterproofing basement in the National Biscuit Company's factory in this city and beg to say that we have never had any trouble with this basement, notwithstanding the fact that it is very deep and must be maintained absolutely dry, as it is used for the storage of flour."

THE AMERICAN CONSTRUCTION CO.

Boston, Mass., October 22, 1918.

"We have yours of the 10th instant, saying you are about to publish a new Medusa Waterproofing catalog and asking for a testimonial, and beg to say the best testimonial we can give you is an order. We are enclosing an order for 12,000 lbs., to be shipped as soon as possible."

WALDO BROTHERS, INC.

Wheeling, W. Va., October 14, 1918.

"Nearly ten years ago we purchased from you our first order of Medusa Waterproofing. Since that time we have sold large quantities of this material for various uses, and had competition from nearly all the other waterproofings manufactured, but to the present time we have always succeeded in obtaining large orders for Medusa Waterproofing, many of these being repeat orders from architects who know that Medusa is satisfactory for all work where waterproofing can be used. We have never seriously considered handling any other brand. We have sold it for use extensively; for foundation walls in Wheeling's flood district, for waterproofing concrete in swimming pools, for wells and cisterns, and lately for waterproofing sprinkler system storage tanks."

F. P. JONES COMPANY,
Geo. A. Bailey, Sec'y-Treas.

Dunkirk, Ind., August 31, 1918.

"We have used Medusa Waterproofing in the basement of our grain elevators and our corn and oat bins extend to the very bottom of the basement. For the past two years we have stored oats at harvest time, which remained in the bins until the following spring. Not a single oat was spoiled. In the corn bins and cribs, where the corn was on the cement bottom in which Medusa Waterproofing was used, we never lost an ear of corn. Medusa Waterproofing deserves a great deal of credit for it certainly is giving satisfaction. We know of nothing superior."

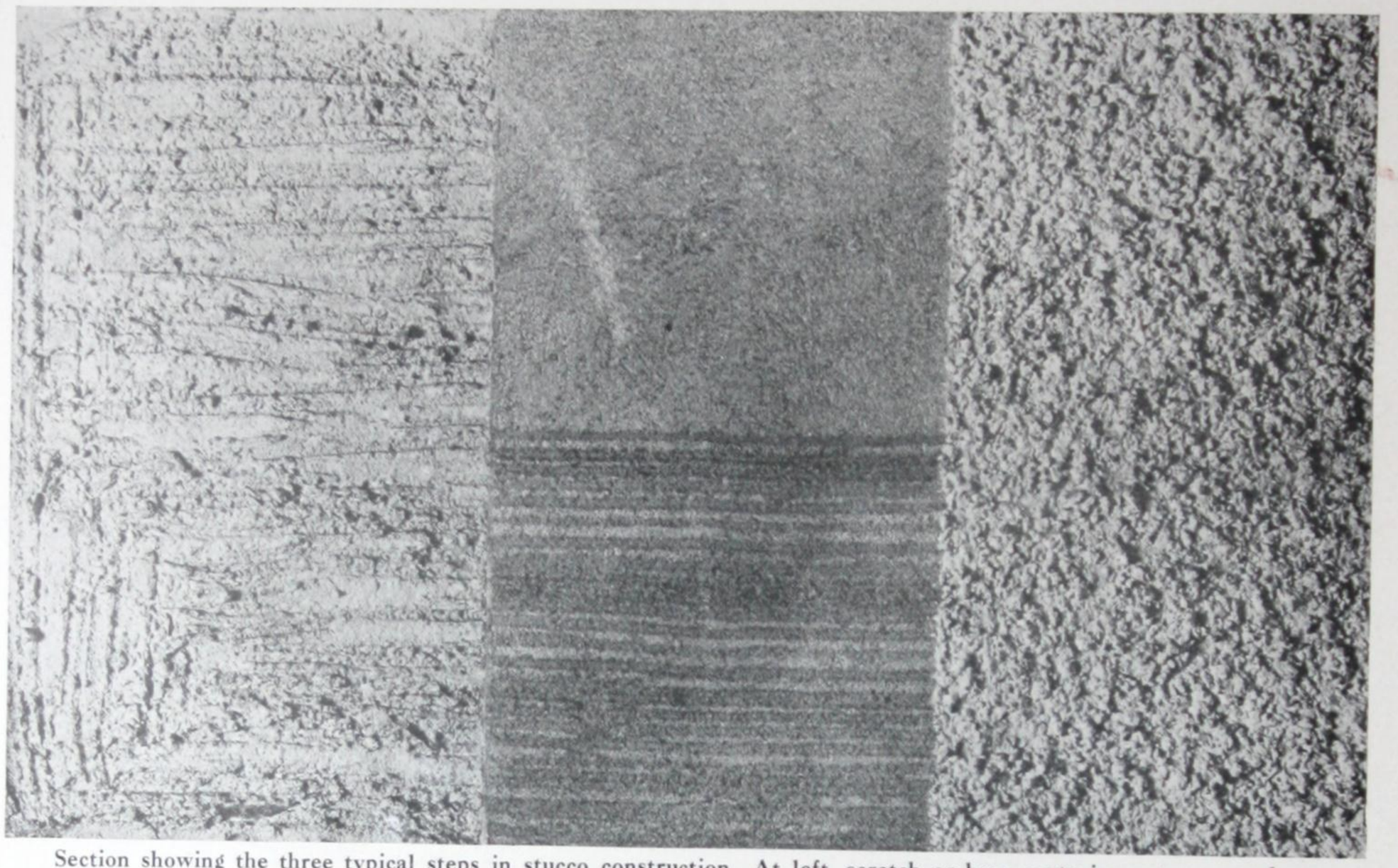
W. L. SKINNER GRAIN CO.

SECTION IV

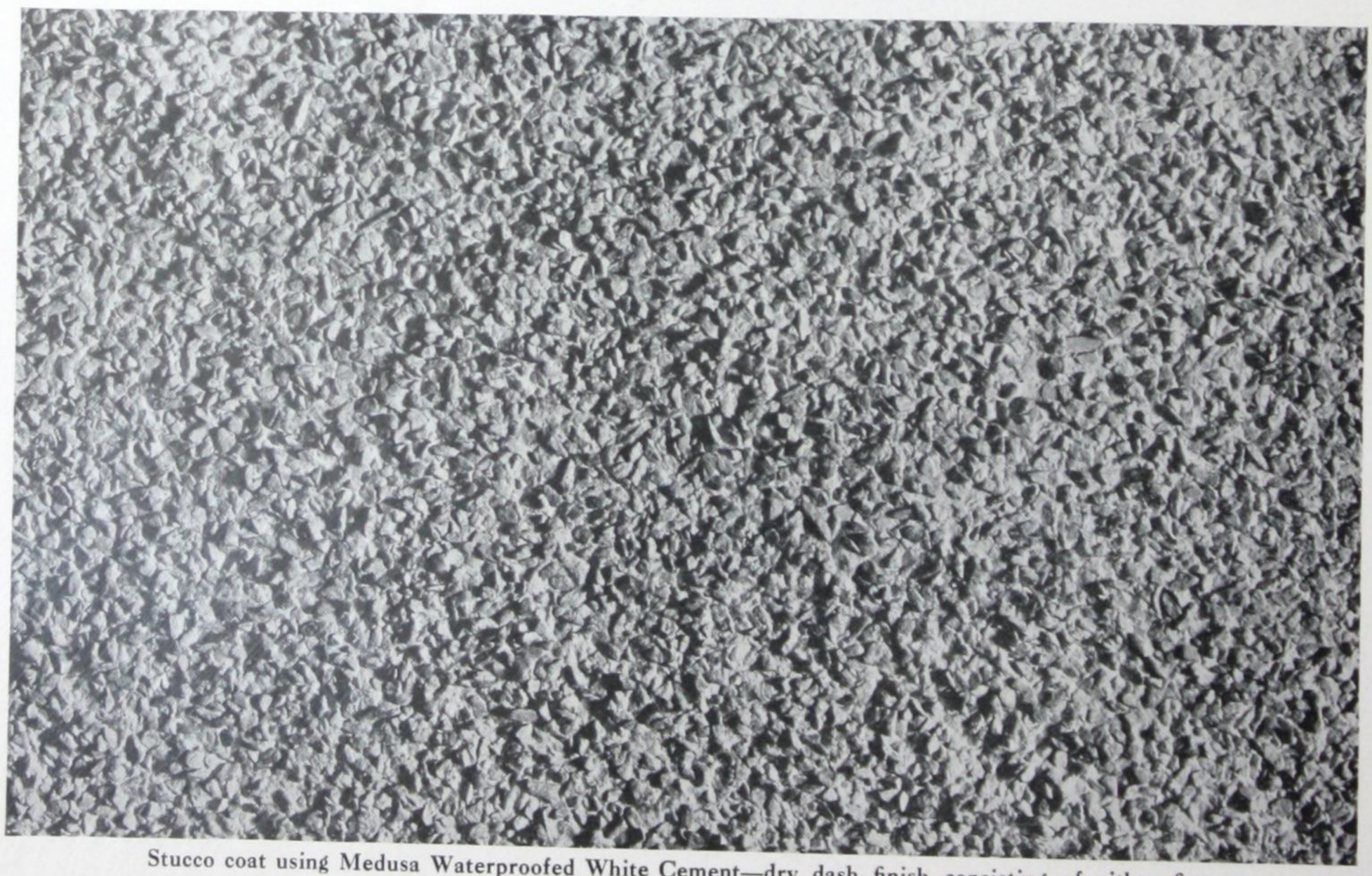
Medusa Waterproofed White Cement

Included Among its Uses are the Following Important Applications:

Artificial Stone
Cement Plaster
Cast Stone
Concrete Block Facing
Cement Brick
Cement Mantels
Floor Tile
Lawn Furniture
Mortar
Lamp Standards
Ornamental Cement Work
Railroad Whistle Posts
Stucco
Swimming Pools
Shower Baths
Stairways
Traffic Markers
Terrazzo Tile
Table Tops and Counters
And Many Others



Section showing the three typical steps in stucco construction. At left, scratch or base coat; in center, second or brown coat; at right, finish coat—Medusa Waterproofed White Cement, dash finish. Complete directions for preparing and applying each coat are given on pages 66 to 69.

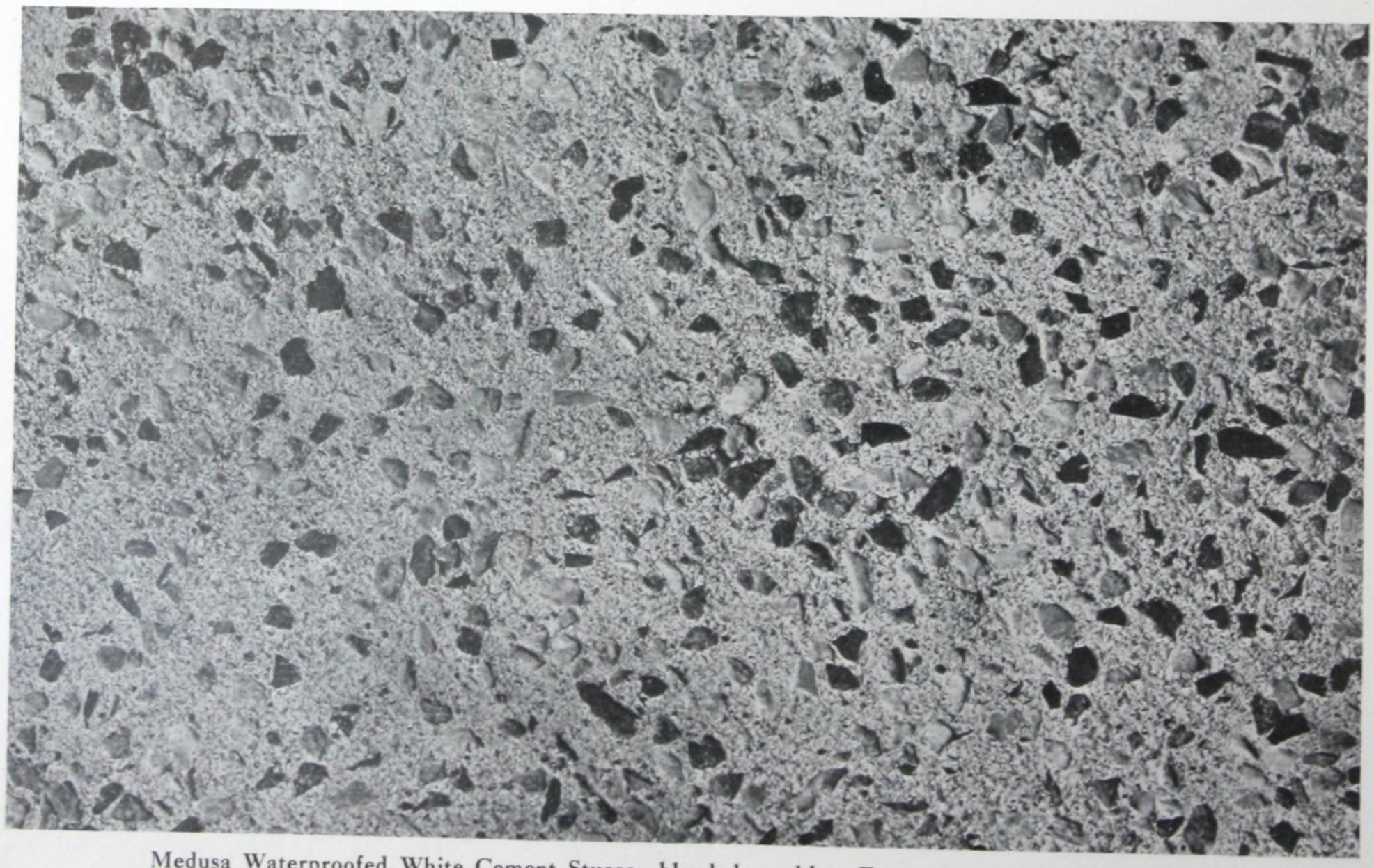


Stucco coat using Medusa Waterproofed White Cement—dry dash finish consisting of either fine marble or granite aggregates.

Stucco coat, using Medusa Waterproofed White Cement—dry dash finish consisting of medium sized silica pebbles.

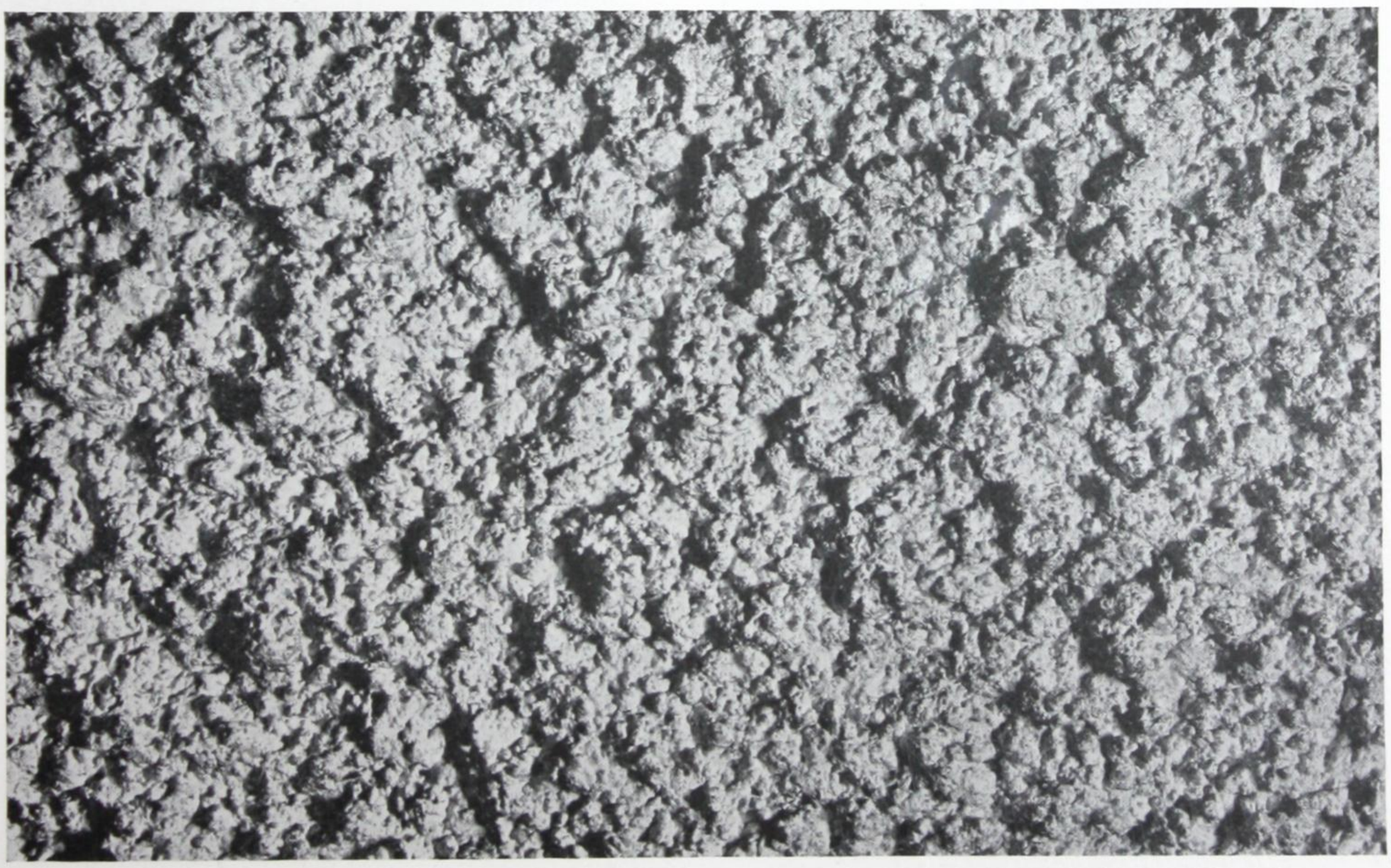
Stucco coat, using Medusa Waterproofed White Cement—dry dash finish consisting of granite or marble chips.

Medusa Waterproofed White Cement used as "butter-coat" in stucco—dash finish of coarse marble chips.



Medusa Waterproofed White Cement Stucco—blended marble. Exposed aggregate finish, either acid or water-washed.

Light texture wet-dash finish stucco coat, using Medusa Waterproofed White Cement and fine white sand.



Heavy texture wet-dash finish stucco coat, using Medusa Waterproofed White Cement and fine white sand.

General Specifications

Waterproofed Portland Cement Stucco

THE following fundamental rules must be considered in the production of good stucco:

a—Use a good rigid background which will not shrink, warp, bend or deteriorate with time.

b—Use proper proportions and carefully selected sand and aggregates of correct fineness.

c—If an absorbent base, such as hollow tile, concrete block or brick is used, it must be sprinkled with water to the point of saturation before applying fresh stucco.

d—All stucco coats—base or scratch coat, second or brown coat, third or finish coat—must be waterproof and non-absorbent. This is just as important in the case of the base coat as any other, since the base coat must not possess sufficient "suction" or absorptive tendency to take up the water from the fresh cement plaster or stucco coat applied to it before the cement has had an opportunity to hydrate, and the coat to set.

e—Each stucco coat must be sprinkled with water before applying the next coat; and the finish coat must be kept evenly moist by sprinkling. In hot weather the work must be shielded from the direct rays of the sun, and protected at all times from the wind.

The importance of these precautions cannot be over-estimated.

1. *Design:*—Whenever the design of the structure permits, an overhanging roof or similar projection is recommended to afford protection to the stucco. It is well for the architect to prevent concentration of water flow getting at the stucco at all, so as to avoid staining of the finish. Stuccoed copings, cornices and other exposed horizontal surfaces should shed water quickly, and whenever departure from the vertical is necessary (at water tables, belt courses, and the like) the greatest possible slope should be obtained.

   Stucco should not be run to the ground—but should have a water table or belt course which is high enough above the ground to avoid splashing of mud and dirt upon the finished surface. The backing should be of tile, brick, stone, or concrete, providing good mechanical bond for the stucco, and must be thoroughly cleaned before plastering.

2. *Flashing:*—Suitable flashing should be provided over all door and window openings wherever projecting wood trim occurs. Wall copings, cornices, rails, chimney caps, etc., should be built of concrete, stone, terra cotta, or metal with ample overhanging drip groove or lip, and water-tight joints.

   If copings are set in blocks with mortar joints, continuous flashing should extend across the wall below the coping and project beyond and form an inconspicuous lip over the upper edge of the stucco—or the copings may be set in mortar composed of Medusa Waterproofed Cement and sand. Continuous flashing with similar projecting lip should be provided under brick sills. This flashing should be so installed as to insure absolute protection against interior leakage.

   Cornices set with mortar joint should be provided with flashing over the top—or set in mortar composed of Medusa Waterproofed Cement and sand. Sills should project well from the face of the stucco and be provided with drip grooves or flashings as described above for brick sills. Sills should also be provided with stools or jamb seats to insure wash of water over the face and not over the ends.

   Special attention should be given to the design of gutters and down-spouts at returns of porch roofs where overflow would result in discoloration and cracking. A 2-inch strip should be provided at the intersection of walls and sloping roofs and flashing extended up and over it, the stucco being brought down to the top of the strip.

3. *Preparation of Original Surface:*—All roof gutters should be fixed, and downspout hangers and all other fixed supports should be put in place, before the plastering is done, in order to avoid breaks in the stucco.

   All trim should be placed in such manner that it will show its proper projection in relation to the finished stucco surface, particularly in overcoating.

Materials

The Cement for the first coat (base or scratch coat) shall be standard gray portland cement conforming to the Specifications of the American Society for Testing Materials, with the addition of Medusa Waterproofing, powder or

paste, to the amount of 2% by weight of the cement used (2 lbs. to the sack of cement).

The Cement for the second or brown coat, and the third or finish coat, shall be Medusa *Waterproofed* White Portland Cement.

4. *Fine Aggregate:*—Fine aggregate shall consist of sand, or screenings from crushed stone or crushed pebbles, evenly graded from fine to coarse, passing when dry a No. 8 screen. Fine aggregates should preferably be of silicious materials, clean, coarse, and free from loam, vegetable, or other deleterious matter.
5. *Hydrated Lime:*—Hydrated lime shall meet the requirements of the standard specifications for hydrated lime of the American Society for Testing Materials, being used to add plasticity to the mixture and to act as a water retainer, sufficient to perfect crystallization, and to prevent too rapid drying out.
6. *Coloring Matter:*—Only permanent, lime-proof colors shall be used. Finish coat containing colors shall be applied as dry as possible to prevent separation of the colors. (The use of Medusa Waterproofing will prevent the gradual washing-out of a color surface.)
7. *Water:*—Water shall be clean, free from oil, acid, strong alkali or vegetable matter.

Preparation of Mortar

8. *Mixing:*—The ingredients of the mortar shall be mixed until thoroughly distributed and the mass is uniform in color and homogeneous. The quality of water necessary for the desired consistency should be determined by trial, and thereafter measured in proper proportion. The water shall be added slowly to the dry mix so as to allow the aggregates to absorb as much as possible in the course of mixing.
9. *Machine Mixing:*—The mortar shall preferably be mixed in a suitable mortar mixing machine of the rotating drum type. The period of machine mixing shall be not less than 3 minutes after all the ingredients are introduced into the mixer.
10. *Hand Mixing:*—The mixing shall be done in a watertight mortar box, and the ingredients shall be mixed dry until the mass is uniform in color and homogeneous. The proper amount of water shall then be added and the mixing continued until the consistency is uniform.
11. *Measuring Proportions:*—Methods of measurement of the proportions of water shall be used which will secure separate uniform measurements at all times. All proportions stated shall be by volume. A bag of cement (94 lbs. net) may be assumed to contain 1 cubic foot. 40 lbs. may be assumed as the weight of 1 cubic foot of hydrated lime. Hydrated lime shall be measured dry, and shall *not* be measured nor added to the mortar in the form of putty.
12. *Retempering:*—Mortar which has begun to stiffen or take its initial set shall not be used.
13. *Consistency:*—Only sufficient water shall be used to produce a good workable consistency. *The less water in the mix, the better the quality of the mortar, within working limits.*

Mortar Coats

14. *Mortar:*—All coats shall be 1 part Waterproofed Portland Cement and 3 parts fine aggregate; hydrated lime for buttering purposes, 10% of the cement used.
15. *Application:*—The plastering shall be applied with a steel trowel and carried on continually in one general direction without allowing the plaster to dry at the edge. If it is impossible to work the full width of the wall at one time, the joining shall be at some natural division of the surface, such as a window or door.

    The first coat shall thoroughly cover the base on which it is applied and shall be troweled enough to insure the best obtainable bond. Before the coat has set it shall be heavily cross-scratched with a saw-toothed metal paddle or other suitable device to provide a strong mechanical key.

    The first coat shall be thoroughly wet down before the second coat is applied. The second coat shall be applied, whenever possible, on the day following the application of the scratch coat, and shall be brought to a true and even surface by screeding at intervals not exceeding 5 feet, and by constant use of straightening rod.

    When the second coat has stiffened sufficiently, it shall be dry floated with a wood float and lightly and evenly cross-scratched to form a good mechanical bond for the finish coat.

    The day following the application of the second coat, and for not less than three days thereafter, the stucco must be thoroughly sprayed at frequent intervals and kept from drying out.

    The finish coat shall be applied not less than a week after the application of the second coat. Methods of application will hereinafter be described under "Finish."
16. *Drying Out:—The finish coat must not be permitted to dry out rapidly, and adequate precaution must be taken to make this certain, by sprinkling frequently after the mortar is set hard enough to permit it, or by*

hanging wet burlap or similar material over the surface, during hot weather.

17. *Freezing:*—Stucco should not be applied when the temperature is below 32 degrees F., nor under any conditions such that ice or frost may form on the surface of the wall.

Finish

18. *Stippled:*—The finishing coat should be troweled smooth with a metal trowel with as little rubbing as possible, and then should be lightly patted with a brush of broom straw to give an even, stippled surface.

19. *Sand Floated:*—The finishing coat, after being brought to a smooth, even surface, should be rubbed with a circular motion of a wood float with the addition of a little sand slightly to roughen the surface. This floating should be done when the mortar has partly hardened.

20. *Sand Sprayed:*—After the finishing coat has been brought to an even surface, it should be sprayed by means of a wide, long-fiber brush—a whisk broom does very well—dipped into a creamy mixture of one part of cement to two or three parts sand, mixed fresh at least every 30 minutes, and kept well stirred. This coating should be thrown forcibly against the surface to be finished.

This treatment should be applied while the finishing coat is still moist and before it has attained its early hardening—that is, within 3 to 5 hours. To obtain lighter shades, add hydrated lime not to exceed 10% of the weight of the cement.

21. *Rough-Cast or Spatter Dash:*—After the finishing coat has been brought to a smooth, even surface with a wooden float, and before finally hardened, it should be uniformly coated with a mixture of one sack of cement to 3 cubic feet of fine aggregate wet to the consistency of cream, and thrown forcibly against it to produce a rough surface of uniform texture when viewed from a distance of 20 feet.

Special care should be taken to prevent the rapid drying out of this finish by thorough wetting down at intervals after stucco has hardened sufficiently to prevent injury.

22. *Applied Aggregate:*—After the finishing coat has been brought to a smooth, even surface, and before it has begun to harden, clean round pebbles, or other material as selected, not smaller than ¼ inch or larger than ¾ inch and previously wetted, should be thrown forcibly against the wall so as to embed themselves in the fresh mortar. They should be distributed uniformly over the mortar, and tamped to an even surface with broad wood float or board.

No rubbing of the surface should be done after the pebbles are embedded.

23. *Exposed Aggregate:*—The finishing coat should contain an approved, selected coarse sand, crushed marble, or granite or other special material, in the proportion given for finishing coats, and within 24 hours after being applied and troweled to an even surface should be scrubbed with a stiff brush and water.

In case the stucco is too hard, a solution of one part hydrochloric (muriatic) acid in four parts of water by volume can be used in place of plain water. After the aggregate particles have been uniformly exposed by scrubbing, particular care should be taken to remove all traces of the acid by thorough spraying with water from a hose.

24. *All Stains* may be readily washed off Medusa Waterproofed White Portland Cement stucco by using a brush and cleaning compound.

25. *Mortar Colors:*—When it is required that any of the above finishes should be made with colored mortar, not more than 10% of the weight of Portland cement should be added to the mortar in the form of finely ground mineral coloring matter.

A predetermined weight of color should be added dry to each batch of dry fine aggregate before the cement is added. The color and fine aggregate should be mixed together and then the cement mixed in.

The whole should be then thoroughly mixed dry by shoveling from one pile to another through a ¼ inch mesh wire screen until the entire batch is of uniform color. Water should then be added to bring the mortar to a proper plastering consistency.

Backgrounds or Bases

Concrete Blocks, Concrete Surfaces, Tile and Brick

Tile:—Shall be hard burned with dove-tail or heavy ragged scoring. Joints are not to be raked, but cut back to the surface of tile.

Surface of tile shall be brushed free from all dirt, dust and loose particles, and prior to application of stucco, shall be wet to saturation to prevent suction and absorption.

Brick:—Brick shall be rough hard burned brick, set with ⅜ inch joints. Joints to be raked out ½ inch from face of brick. Surface of brick shall be brushed free from all dirt, dust and loose particles, and prior to application of stucco, shall be wet to complete saturation.

Old brick walls which are to be overcoated shall have all loose, friable or soft mortar removed from the joints to a depth of at least ½ inch. Brick surfaces, painted or waterproofed, shall be covered with metal lath.

Extremely soft brick must be covered with metal lath or fine poultry wire, well stapled.

Concrete Blocks:—Shall be rough and coarse, but not friable, and set in cement mortar, with joints raked out at least ½ inch deep. Surface of blocks shall be brushed free from all dirt, dust and loose particles, and, prior to application of stucco, shall be wet to saturation.

Concrete Surfaces:—Concrete surfaces shall be hacked or roughened by drills, so as to provide bond for stucco. After hacking, surface shall be washed down with a solution of 1 part muriatic acid to 10 parts water. After acid solution has exhausted itself, surface is to be washed down, to remove any remaining acid. Wirebrush surface, so as to remove all loose pieces or particles of concrete.

Prior to application of stucco, wet the wall thoroughly so as to prevent absorption of water from stucco, and apply a good creamy cement grout an hour before applying stucco.

Smooth Surface:—To obtain a smooth surface, after troweled finish has become sufficiently hard: Rub carefully with fine carborundum stone and water; rinse with clean water; grout with clear cement and allow to remain for week or longer; rub to smooth finish.

Stucco on Metal Lath

Where Sheathing is Used

Sheathing:—Sheathing boards shall not be less than 6 inches nor more than 8 inches wide, dressed on one or both sides to a uniform thickness of 13-16 inch; laid horizontally across wall studs and fastened with not less than two 8D. nails at each stud.

Over sheathing boards shall be laid in horizontal layers, beginning at the bottom, a substantial paper, well impregnated with tar or asphalt. The bottom strip shall be laid over the baseboard at the bottom of the wall, and each strip shall lap the flashings at all openings.

Materials—Hair or Fiber:—Use only first quality long hair—no foreign matter—or a long fiber well combed out. 1 lb. hair per sack of cement.

Back-plastered—No Sheathing

Framing:—Studs spaced not to exceed 16-inch centers should be run from foundation to rafters without any intervening horizontal members. The studs should be tied together just below the floor joists with 1 x 6 inch boards which should be let into the studs on their inner side, so as to be flush, and securely nailed to them. These boards will also act as sills for floor joists, which should be securely spiked to the side of studs.

Bracing:—Corners of each wall shall be braced diagonally with 1 x 6 inch boards let into studs on inner side, securely nailed to them.

In back-plastered construction in which sheathing is omitted, at least once midway in each story height, the studs shall be braced horizontally with 2 x 3 inch bridging set 1 inch back of the face of the studs. This assumes that the studs are 2 x 4 inches. Larger sizes require larger bridging.

Furring:—½"—22 gage crimped furring is to be fastened direct to the studding, using 1¼"x14 gage staples placed 12 inches apart.

Lath:—Expanded metal, or wire mesh, galvanized or painted, weighing at least 3.4 lbs. per sq. yd.

Metal lath shall be placed horizontally drawn tight, and attached with 1¼" x 14 gage staples, or 6 D. nails driven to a penetration of at least ⅞ inch and bent to engage at least one rib, not over 8 inch o. c.

Lath shall not be lapped more than 1 inch horizontally and tied with 18 gage black tie wire at least once between studs. Vertical laps shall not be more than 1 inch and shall occur at supports. Lapped ends fastened with staples or 6 D. nails not over 4 inch o. c.

Corners:—The sheets of metal lath shall be folded around the corners for at least 3 inches but not more than 4 inches and well stapled down.

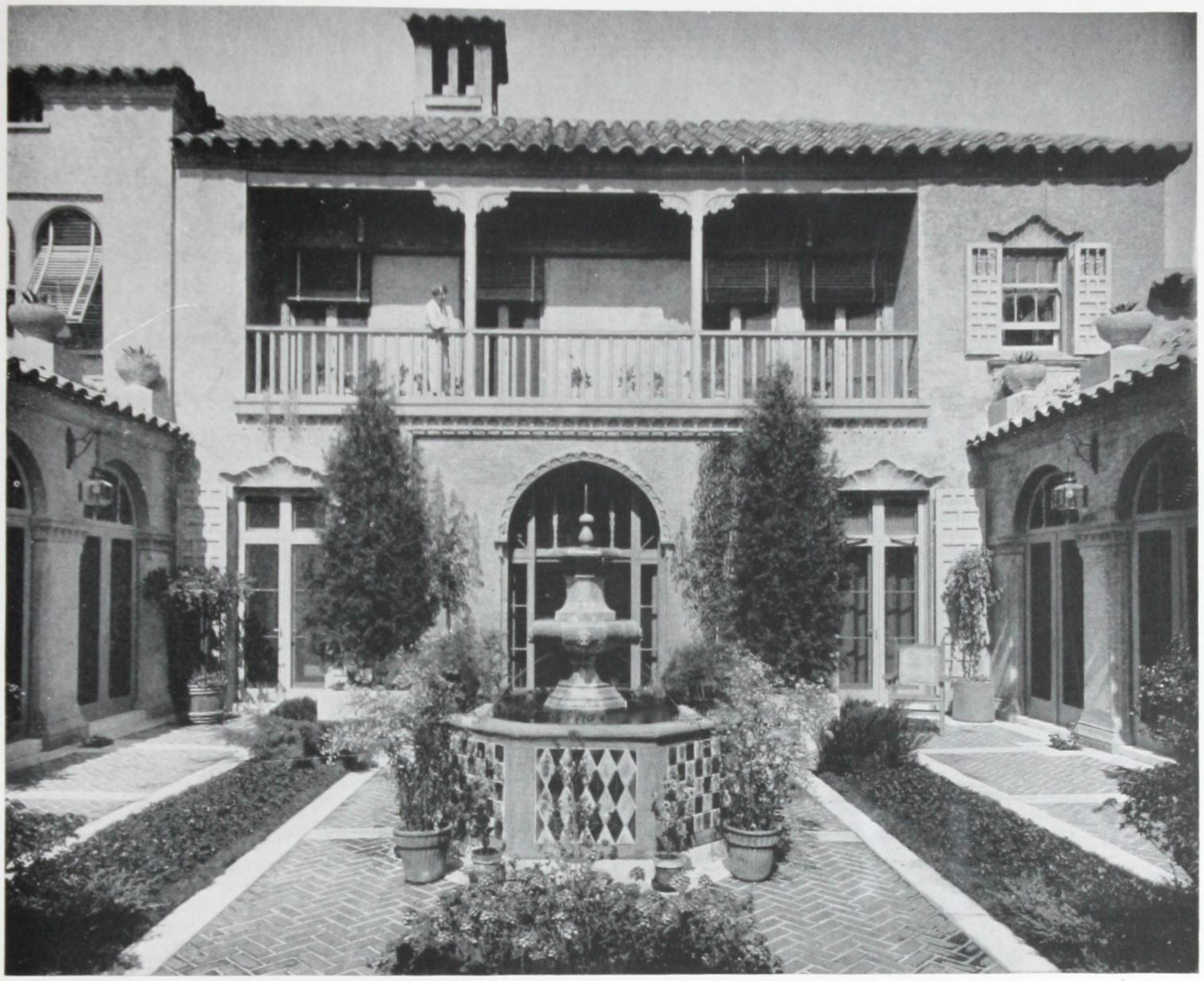
Corner bead is not recommended, but a strip of diamond mesh expanded metal, 24 gage, formed to a 6 inch angle, may be used.

Insulation:—The air space in back-plastered walls may be divided by applying building paper, quilting, felt, or other suitable insulating material between the studs, and fastening it to the studs and bridging by nailing wood strips over the folded edges of the material. This insulation shall be so fastened as to leave about 1 inch air space between it and stucco. Keep insulating material clear of stucco; make tight joints against the framing.

Backing Coat:—Shall be applied directly following the completion of the brown coat. The keys of the scratch coat shall first be thoroughly dampened, and the backing coat well troweled on to insure filling spaces between keys and thoroughly covering back of lath. The backing coat shall provide a total thickness of plaster back of lath of ⅝ or ¾ of an inch.

LOS ANGELES OFFICE OF THE AUSTIN COMPANY OF CALIFORNIA, Industrial Engineers and Builders. Medusa Waterproofed White Cement, with a coloring material, was used for the outside stucco. Designed and built by The Austin Company of California.

ARROYO GARDENS HOTEL, DAYTONA, FLORIDA. Medusa Waterproofed White Cement used for stucco work. Mr. Jacob Espedahl, designer and builder. Medusa products furnished by Malby Conrad Lumber Company.



ROBERT S. MOORE RESIDENCE, MENLO, CALIFORNIA. Medusa White Cement both waterproofed and plain, was used in the basement walls, outside stucco and ornamental work such as the fountain pictured. Mr. Albert Farr, San Francisco, Architect.

RESIDENCE OF MR. J. L. CARMEN, GRAVELLY LAKE, NEAR TACOMA, WASHINGTON. Medusa Stainless White Cement Stucco on hollow tile. Mr. Kirtland Cutter, Spokane, Architect; Dawson & Dahlberg, Tacoma, General Contractors; stucco applied by Fred Stabbert, Tacoma. Medusa Cement supplied by Galbraith & Co., Seattle.

General Specifications

Medusa Waterproofed White Cement for the Lining of Pools

The following specifications will produce a smooth, permanently white and water-repellent lining for both indoor and outdoor pools.

The bottom, walls, gutter and platform around the pool shall be finished with Medusa Waterproofed White Cement, and an aggregate consisting of equal parts of clean white sand and crushed white marble, grading from dust to particles passing a 1/8" mesh screen.

Mixing

The mix shall be one part Medusa Waterproofed White Cement, and two and one-half parts white aggregate. For quicker results and easier mixing, dampen or sprinkle the aggregate before mixing with the Waterproofed Cement, thoroughly mix the two materials together and then add just enough water to obtain the proper consistency.

Thickness

The finish over bottom and platform shall be not less than 1½" thick. Finish of walls shall be applied in two coats, each not less than 3/8" thick.

Preparation of Surface

The concrete surface shall be mechanically roughened or hacked by means of stone masons' hammers, drills, or similar tools, exposing the matrix of the concrete and having ¼" to 3/8" holes every 2" to 3" apart, so as to provide better bond for the cement plaster.

Remove all loosened pieces and apply freely to the cleaned area a solution of 1 part of muriatic acid and 10 parts of water, using a fibre or acid brush. Allow acid solution to remain on concrete until the acid exhausts itself, approximately 10 minutes.

Wash the surface with water from a hose, being careful to remove all of the acid solution. Go over the walls with stiff wire brushes, or, where available, compressed air or steam may be used, and remove any remaining loose pieces or particles.

Saturate the entire surface with water to prevent the concrete absorbing water from the cement plaster before the cement has set.

Prepare a grout of Portland cement, and water. Mix to a creamy consistency and apply with a fibre brush to the cleaned surface, brushing the grout thoroughly into the concrete.

If the walls are of brick or concrete blocks, rake out the joints, ½" or ¼" deep, removing all loose or crumbling mortar, and proceed as heretofore specified, roughening the surface.

Application of Cement Plaster

Apply the first coat of plaster 3/8" thick, troweling the plaster well into the concrete surface so as to secure a proper bond. Thoroughly scratch the first coat. Do not use nails, trowels, or scratch too deep.

As soon as the first coat has set hard enough, apply the second coat 3/8" thick, troweling the plaster with sufficient pressure to obtain maximum density and to close all surface pores, leaving a tight, close-grained finish.

Cut the second coat of plaster off 6" above the finished floor line, to provide for a coved base.

After the walls have been plastered, prepare the surface of the floors including the 6" base at the walls in the same manner as the walls.

Have the floor cleaned, saturated with water and apply a coat of grout as described above for the walls. Use extreme care to prevent mud or dirt being brought on the grouted surface.

Apply a 2" coat of cement plaster over the floor, joining the coved base with the finished wall cement plaster.

Where joints must be made in cement plaster work, run the cement work an inch or two beyond the contemplated joint. After plaster has set, cut this surplus off on as broad bevel as possible, giving this bevel a good coat of grout prior to applying subsequent plaster.

In Case Water Interferes With the Work

If there is a continual seepage through the walls, holes must be bored in the walls and tubes or small gas pipes inserted to concentrate the flow of water and relieve the pressure while the plaster coat is being applied. Caulk around pipes.

Drainage pipes should remain open until the waterproofed coat has thoroughly set and is capable of resisting the pressure by its own ad-

hesive strength, after which remove pipes and plug holes with cork or wood and cover with waterproofed cement plaster.

If the water pressure is exceedingly great, it will be necessary to sink sumps on the exterior of the walls to a depth below the basement floor level, and keep pumps going continually until the plaster has thoroughly set.

Keep Finished Surface from Drying Out Too Fast

The finished surface must be protected from too rapid drying out, by keeping moist for at least a week to allow it to thoroughly harden and to prevent hair-cracks. Sprinkle or wet with a hose or cover with canvas or burlap kept continually wet.

General Specifications

Mortar for Laying Enameled Brick or Glazed Tile

In pools lined with enameled brick or similar finish, Medusa Waterproofed White Portland Cement should be specified and used for the mortar in which the brick or tile is laid. For quicker results and easier mixing, dampen or sprinkle the aggregate before mixing with the Waterproofed Cement, thoroughly mix the two materials together and then add just enough water to obtain the proper consistency.

An important use of Medusa Waterproofed White Cement can also be made in the treatment of floors, walls, steps, etc., and for the entire finish of shower and locker rooms.

Proportions

All concrete shall consist of one (1) part Portland cement, two (2) parts sand and four (4) parts aggregate.

Reinforcing

The footings, floors and walls of pool, walk around pool and slab over valve room shall be reinforced as shown on plans and details and described elsewhere in the specifications.

Portland Cement

The Portland cement shall be a standard brand of known quality which will pass requirements of the American Society for Testing Materials.

Sand

The sand shall be hard, well graded, clean and free from clay, loam, vegetable and other deleterious matter. Fine sand, uniform sized grains or an average bank sand will not be acceptable.

Aggregate

The aggregate shall be crushed trap rock, gravel, crushed granite, or crushed limestone graded from ½″ to that which will pass a 1½″ ring.

Stearate Waterproofing

The concrete walls and floors of the pool and the topping of the walk around the pool and over the valve room shall be waterproofed with Medusa Integral Waterproofing, to be used in accordance with the manufacturers directions.

The Contractor is given the option of using Medusa Waterproofed Cement instead of Medusa Waterproofing and ordinary Portland Cement.

Fill

After all footings are poured, under the entire area of the floor of the pool put in a 12″ fill of well burned and clean automatic stoker cinders, well sprinkled and tamped solidly into place. No ashes, unburned coal or rubbish will be permitted.

Waterproofing Powder Mixing

Two pounds of Medusa Waterproofing is to be mixed with each bag of Portland Cement. Where a concrete mixer is used the waterproofing powder should be added directly to the cement at the hopper, or on the loader. The sand is then added and these three materials turned over in the mixer by allowing the drum to revolve four or five complete turns, after which the aggregate and water are added.

Waterproofing Paste

Two pounds of Medusa Waterproofing Paste are to be used for each bag of Portland Cement. Equal volumes of Waterproofing Paste and water are mixed together thoroughly, and this paste water is added to the gauging water used in the concrete. The Contractor must determine the amount of water he will use in each batch of concrete and govern the amount of waterproofing accordingly.

Waterproofed Cement

Medusa Waterproofed Portland Cement is used in a concrete mixer exactly the same as is a plain Portland Cement. The proper percentage of waterproofing is ground with the cement.

The Contractor must not use any greater volume of gauging water than will give a jelly-like or mushy concrete. Concrete containing

(Continued on page 74)

ARLINGTON MEMORIAL AMPHITHEATER, WASHINGTON, D. C.; typical exterior view. White marble, set in Medusa Stainless White Cement Mortar. Messrs. Carrere & Hastings, New York, Architects. George L. Fuller Co., General Contractors. See Specification page 77.

Consistency of Concrete

(Continued from page 73)

sufficient water to permit a settling or segregation of the heavier ingredients will be rejected.

Placing

Concrete shall be placed immediately after mixing and shall be thoroughly spaded around the reinforcing and against the face of the forms, to insure maximum density and freedom from honeycombed places.

Joints

If it is not possible to pour the floors or walls continuously the Contractor must arrange for satisfactory joints. The floor of the pool shall be laid out in properly proportioned panels with water-tight joints. The walls will be divided into vertical panels which will be poured continuously from bottom to top. No horizontal joints will be permitted.

Curing

After pool is poured and forms removed the concrete shall be kept as wet as possible by frequent sprinkling of the walls, while the floor shall be covered with a 2″ layer of clean sand which is to be sprinkled often enough daily to keep the top of the floor slab wet.

Finish

After forms are removed and pool cleared of lumber and rubbish, the wall and floor surfaces are to be prepared to receive such finish as is called for elsewhere in the General Specifications.

General Specifications

Impervious White Portland Cement Mortar for Laying Face Brick

Non-Staining Waterproofed Cement

Cement shall be Medusa Waterproofed White (Non-Staining) Portland Cement, manufactured by The Sandusky Cement Company, Cleveland; or other approved white (non-staining) Portland cement conforming with the requirements of the American Society for Testing Materials, and guaranteed by the manufacturers to contain 20% or more of water-repellents, ground in with the cement during process of manufacture at the mill.

Waterproofing mixed with a non-staining cement by hand or machine at the job or elsewhere, will not be permitted to be used.

Sands

Sands shall be clean bank sands, light in color and evenly graded from fine to coarse, all passing thru a 1/8" mesh sieve, with voids not in excess of 35% by water after thoroughly drying.

Measuring

Assuming that one bag of Portland Cement contains one cubic foot, other aggregates are to be measured accordingly by the use of a bottomless box that holds one cubic foot. *The measuring of sand or other material with a shovel or other implement that has no positive dimensions will not be allowed.*

Mixing

When mortar is hand mixed, dampen the sand to a damp earth consistency, add the Waterproofed Cement and hydrated lime, and mix as usual. When sand, Waterproofed Cement and lime are uniformly mixed add only enough water to secure proper consistency.

When a batch mortar mixing machine is used dampen the sand and put into the mixer with the Waterproofed Cement and hydrated lime; allow mixer to run until cement, sand and lime are uniformly mixed. Then add only enough water to secure proper consistency.

Water

Water in all cases must be added slowly and only sufficient water used to reach a stiff, workable consistency.

Mix

1 part Medusa Waterproofed White Portland Cement.
1-5 part Hydrated Lime, by volume.
3 parts sand, as before mentioned.

Joints

Should a joint exceeding 5/8" be desired, the necessary amount of coarse grit may be added to the above mortar.

The object of using Medusa Waterproofing is to overcome *discoloration, dampness and efflorescence.*

WESTERN ELECTRIC BUILDING, NEW YORK. Common brick veneer laid in standard portland cement, waterproofed with Medusa Waterproofing. Messrs. McKenzie, Voorhees & Gmelin, New York, Architects. Turner Construction Co., New York, General Contractors. Mr. H. Hynds of the Turner Construction Co., wrote early in 1922: "All of the brick veneer in the Western Electric Building, New York City, was laid up in Portland Cement mortar, waterproofed with Medusa Waterproofing Compound. This building has now gone through two winters and shows no signs of dampness or efflorescence."

General Specifications

Impervious Portland Cement Mortar to Prevent Efflorescence, Dampness and Discoloration of Face Brick

Waterproofed Cement Mortar

All exterior brick work shall be laid up in cement mortar that has been gauged with 2% by weight of the cement (8 lbs. to the barrel) Medusa Waterproofing Paste or Powder, mixed according to the directions of the manufacturers or their representatives.

Mix

1 part approved Portland Cement.

1-5 part Hydrated Lime, by volume.

3 parts evenly graded, clean, sharp sand, all passing through a 1/8" mesh sieve.

Only sufficient water should be used to make a stiff, workable consistency. Medusa Waterproofing Powder must be thoroughly incorporated with the dry cement, then in turn with the sand, before the larger aggregate is added.

Measuring

Assuming that one bag of cement contains one cubic foot, other aggregates are to be measured accordingly by the use of a bottomless box that holds one cubic foot. The measuring of sand or other material with a shovel or other implement that has no positive dimensions will not be allowed.

Gauging Solution

When Medusa Waterproofing Paste is preferred, the manufacturers recommend that 1 gallon (8 lbs.) Medusa Paste shall be added to 20 gallons of water. This, when based on dry conditions, is sufficient to gauge one barrel of cement. The water content of the sand must be carefully considered, which ranges from 8% to 28% and the strength of the solution made accordingly.

General Specifications

Waterproofed Non-Staining Portland Cement Mortar for Setting, Backing and Pointing Marble and Stone

Non-Staining Waterproofed Cement

Cement shall be Medusa Waterproofed White (Non-Staining) Portland Cement, manufactured by The Sandusky Cement Company, Cleveland; or other approved white (non-staining) Portland cement conforming with the requirements of the American Society for Testing Materials, and guaranteed by the manufacturer to contain 20% or more of water-repellents, ground in with the cement during process of manufacture at the mill.

Waterproofing mixed with a non-staining cement by hand or machine at the job or elsewhere, will not be permitted to be used.

Sands for Mortar

Sands shall be clean bank sands, light in color and evenly graded from fine to coarse, all passing thru a 1/8" mesh sieve, with voids not in excess of 35% by water after thoroughly drying.

Crushed Marble for Pointing

Crushed White Marble for pointing mortar shall be equal to Conlin Marble Company's, Tuckahoe, N. Y., size 20 to 30.

Mixing

Assuming that one bag of Portland Cement measures one cubic foot, other aggregates are to be measured accordingly by the use of a bottomless box that holds one cubic foot. The measuring of sand or other material with a shovel will not be permitted.

Water

Sufficient water only shall be used to reach a stiff yet workable consistency.

Marble

All marble must be sufficiently embedded and back plastered in the following mortar to form one continuous coating. Special attention must be given to all belt courses, copings and other exposed surfaces.

Mortar Setting

Mortar for the setting and backing of marble shall consist of:

1 part Medusa Waterproofed White Portland Cement.

1-5 part Hydrated Lime, by volume.

3 parts Sand, as before mentioned.

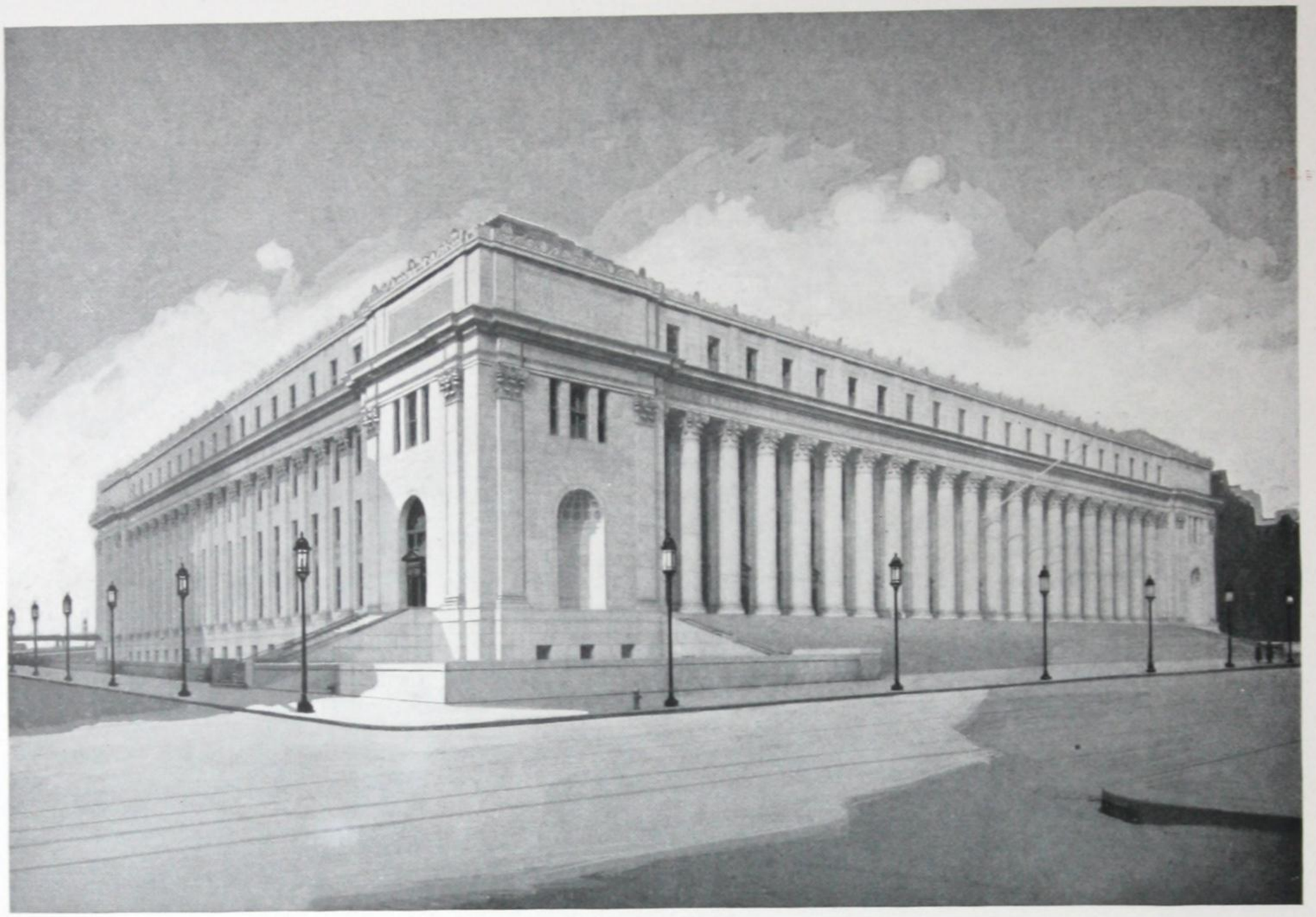
Mortar Pointing

Mortar for pointing of marble to consist of:

1 part Medusa Waterproofed White Portland Cement.

1-5 part Hydrated Lime, by volume.

2½ parts White crushed Marble as before mentioned.



NEW YORK CITY POSTOFFICE. Built of granite laid in Medusa Non-staining White Cement exclusively. "Medusa" was also used for facing exterior of walls and court yards. 6,000 barrels required. Declared to be one of the finest buildings of its kind erected in New York in recent years.

JOHN HANCOCK BUILDING, BOSTON, MASS. Parker, Thomas, Rice, Architects. When writing us recently the Contractors, L. P. Loule and Son, included the following remark in their letter, "not a weeping joint visible."

SECTION V

The Application *of* Medusa Waterproofing, and Medusa Waterproofed Cements, to the Construction of Indoor and Outdoor Pools

MEDUSA Waterproofing makes concrete pools permanently leak-proof.

That simple statement of fact tells the real reason why Medusa Waterproofing, and Medusa Waterproofed Cements, have been used in the construction of indoor and outdoor pools by the thousands, in every section of the country. It tells why leading Architects and Contractors specify and use "Medusa" in work where *good looks,* plus permanent *service,* are equally important factors.

Medusa Waterproofed Gray Cement, or Medusa Waterproofing added to a reliable plain gray cement, should be used for general concrete work in the pool itself, and for walls and floors in shower and locker rooms, etc. Medusa Waterproofed White Cement should be used to line the body of the pool, or for mortar for setting enameled brick or glazed tile, in case that type of construction is used.

The specifications that follow, cover accepted practices in the design and construction of indoor and outdoor pools. The illustrations in the ensuing pages show a number of "Medusa" pools in many parts of the country.

General specifications covering waterproofed white cement lining for pools, and waterproofed white cement mortar for enameled brick or glazed tile, are given on pages 72, 73 and 74.

A Letter from Mr. Louis E. Jallade of New York, an Eminent Specialist on Swimming Pools. "In Ninety-Odd Pools where we have used 'Medusa,' we have not had a Single Leak"

Mr. Louis E. Jallade, Architect and Engineer, of New York, widely recognized for his notable work in the design and construction of swimming pools, has written an interesting letter relative to his experience with Medusa Waterproofing. We are glad to publish it here, because it contains also a number of valuable suggestions on the fundamentals of successful pool construction.

Mr. Jallade's letter follows:

"The planning of a swimming pool whether indoors or outdoors has developed to such an extent that it has become the work of experts. A comparison of the swimming pool of today with one of fifteen years ago will show the difference in the technique of its construction.

"It is very important to design the shell of the pool so that it will be a self-contained, self-supporting box so that if there is any settlement in the material upon which it rests, that the box will not warp and cause loss of water through cracks.

"In order to accomplish the construction of such a box, it is necessary to use reinforced concrete. The use of steel plates has long ago been abandoned.

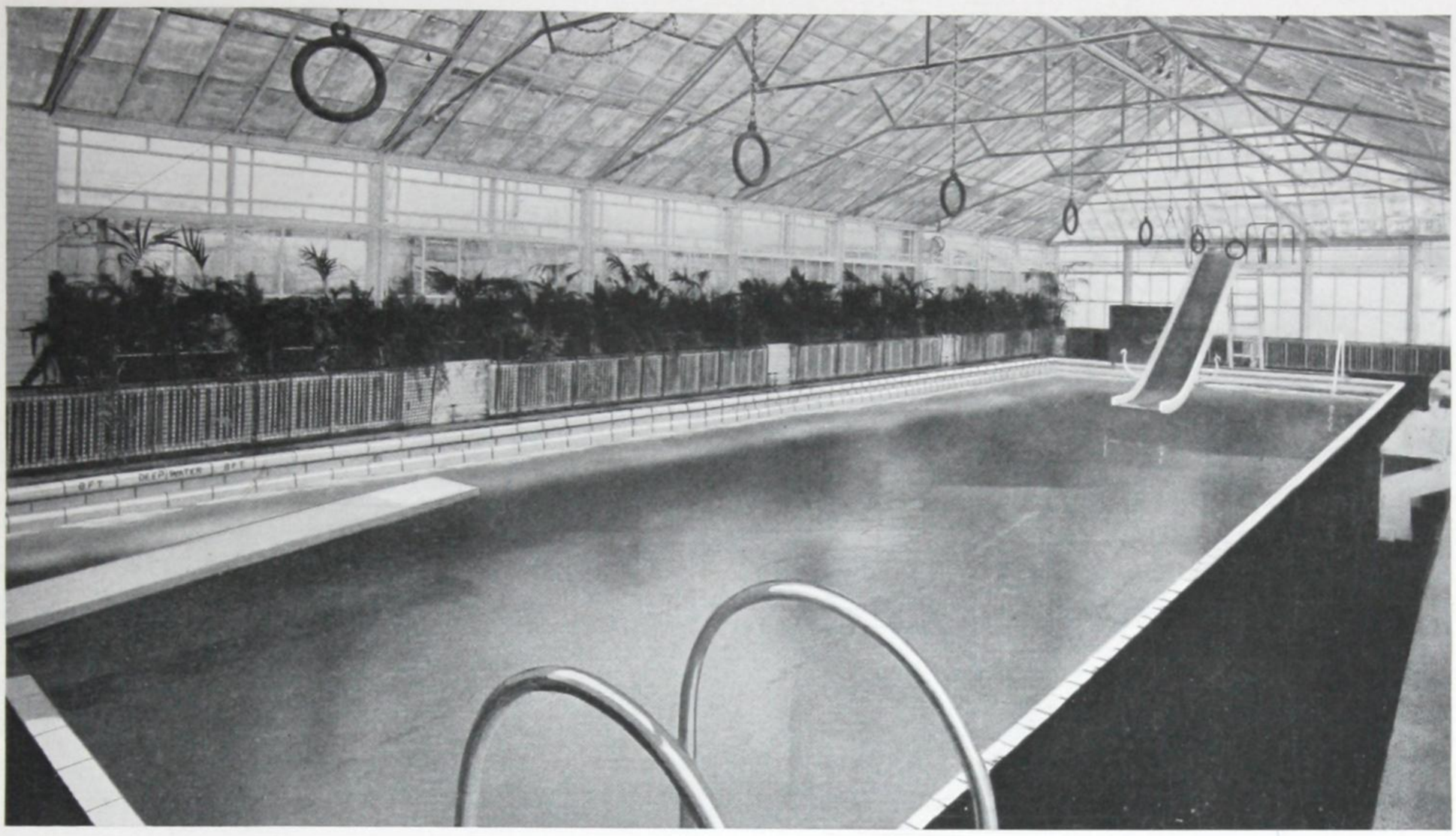
"This reinforced concrete, because of the expense of excavation, must necessarily be kept thin in the walls and bottom and further in the design of the reinforcement must be calculated with a great deal of care especially if recessed ladders enter into the equation. This reinforced box must be watertight.

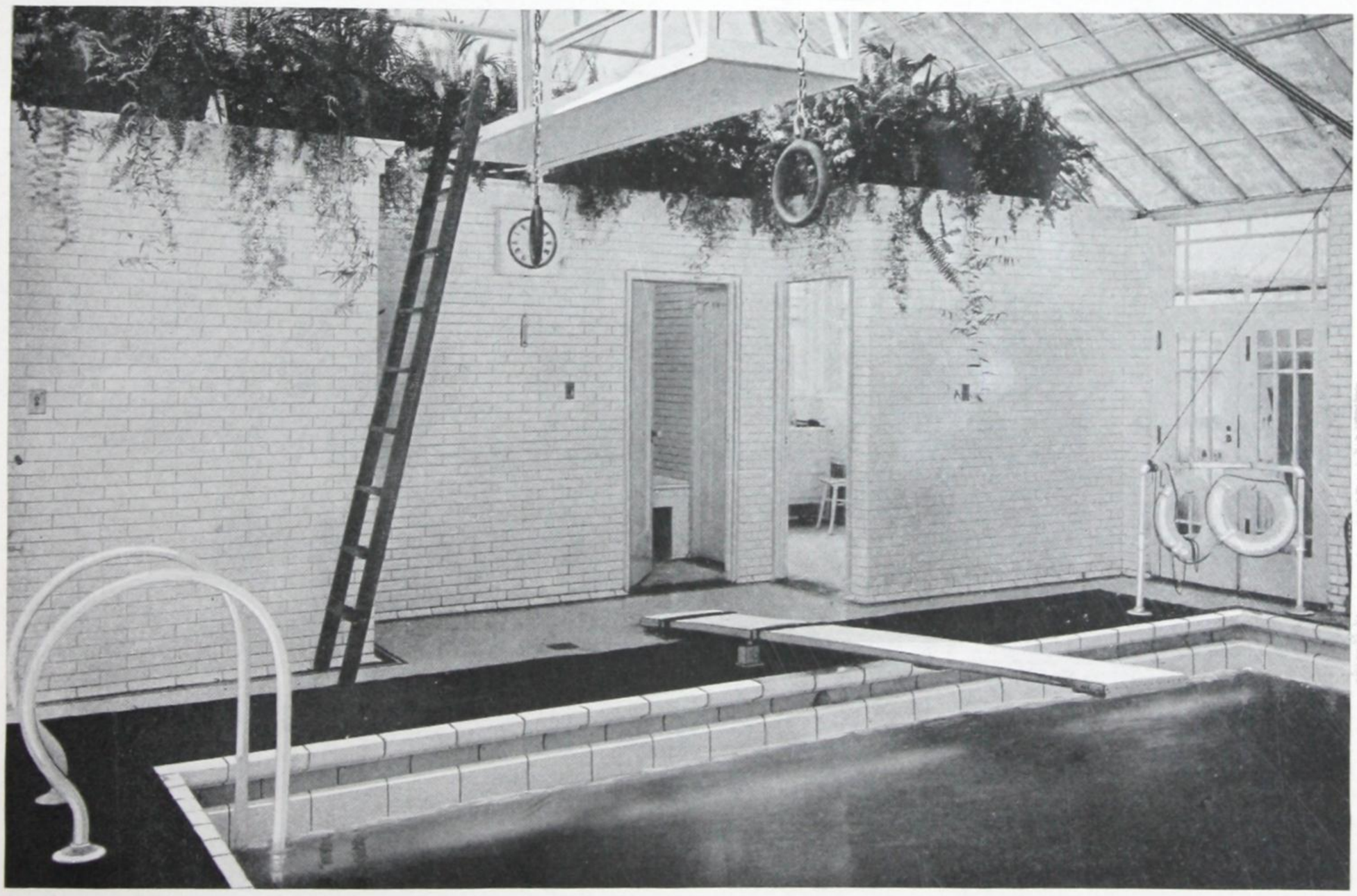
"It is impossible to make cement watertight without a mixture of waterproofing compound. No matter how dense you make it, it is impossible to make it watertight.

"There are many waterproofing compounds on the market, both dry and liquid, and care must be taken to choose one which will not weaken the strength of the concrete and one which will not retard the flow of the concrete when it is poured in the form.

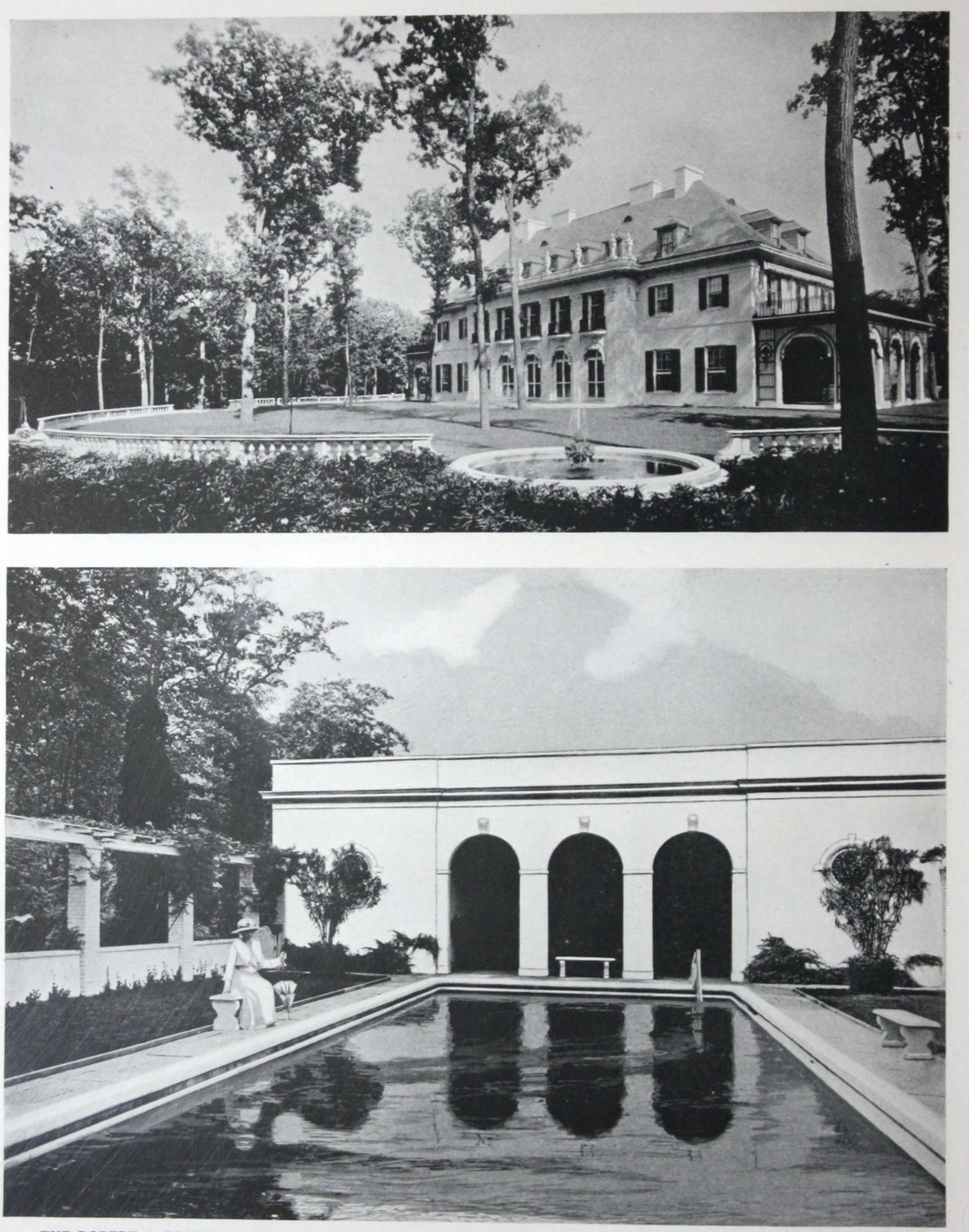
"In most of our swimming pools, we have used Medusa Waterproofing. We are continuing to use it because we have no difficulty in obtaining it from the dealers in almost every part of the country where we build pools.

"We find that it always runs uniform and in the ninety odd pools where we have used Medusa, we have not had a single leak."

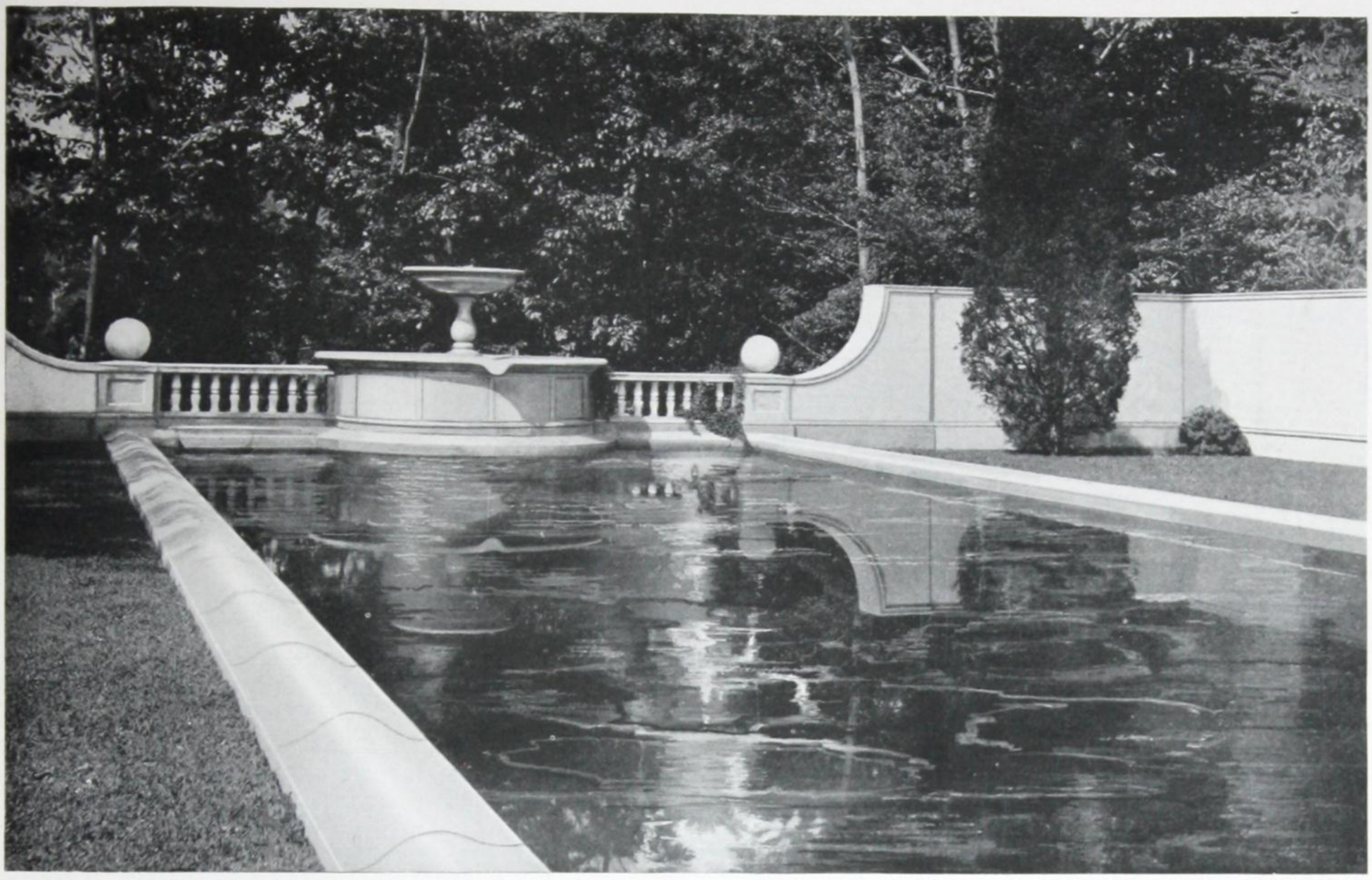




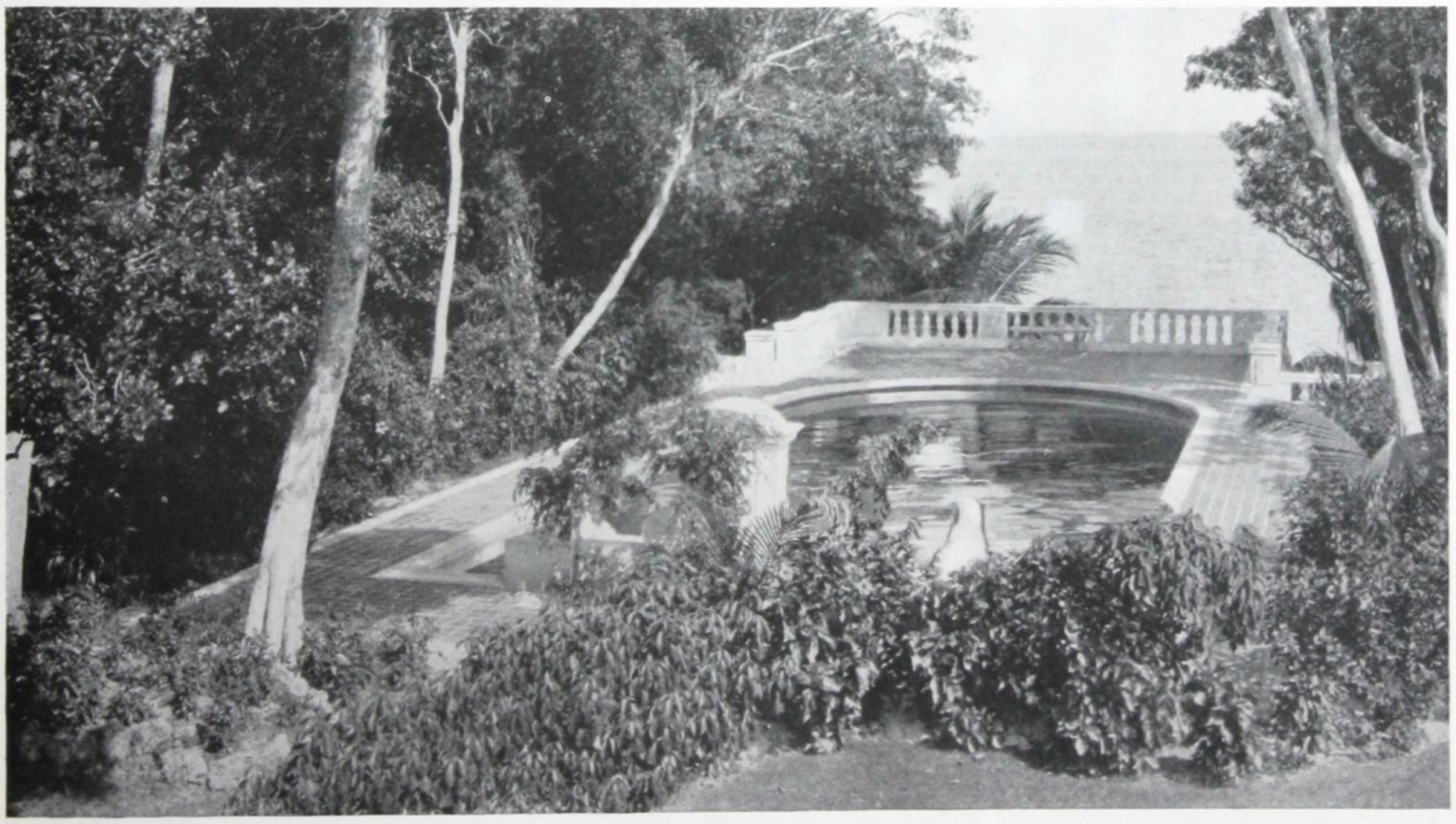
ESTATE OF MR. LOUIS F. SWIFT, LAKE FOREST, ILLINOIS. All the tile in the pool, floor and walls were laid up in Medusa Waterproofed White Cement preventing absorption of water through the joints. Messrs. Ralph C. Harris and Byron H. Jillson, Chicago, Architects.



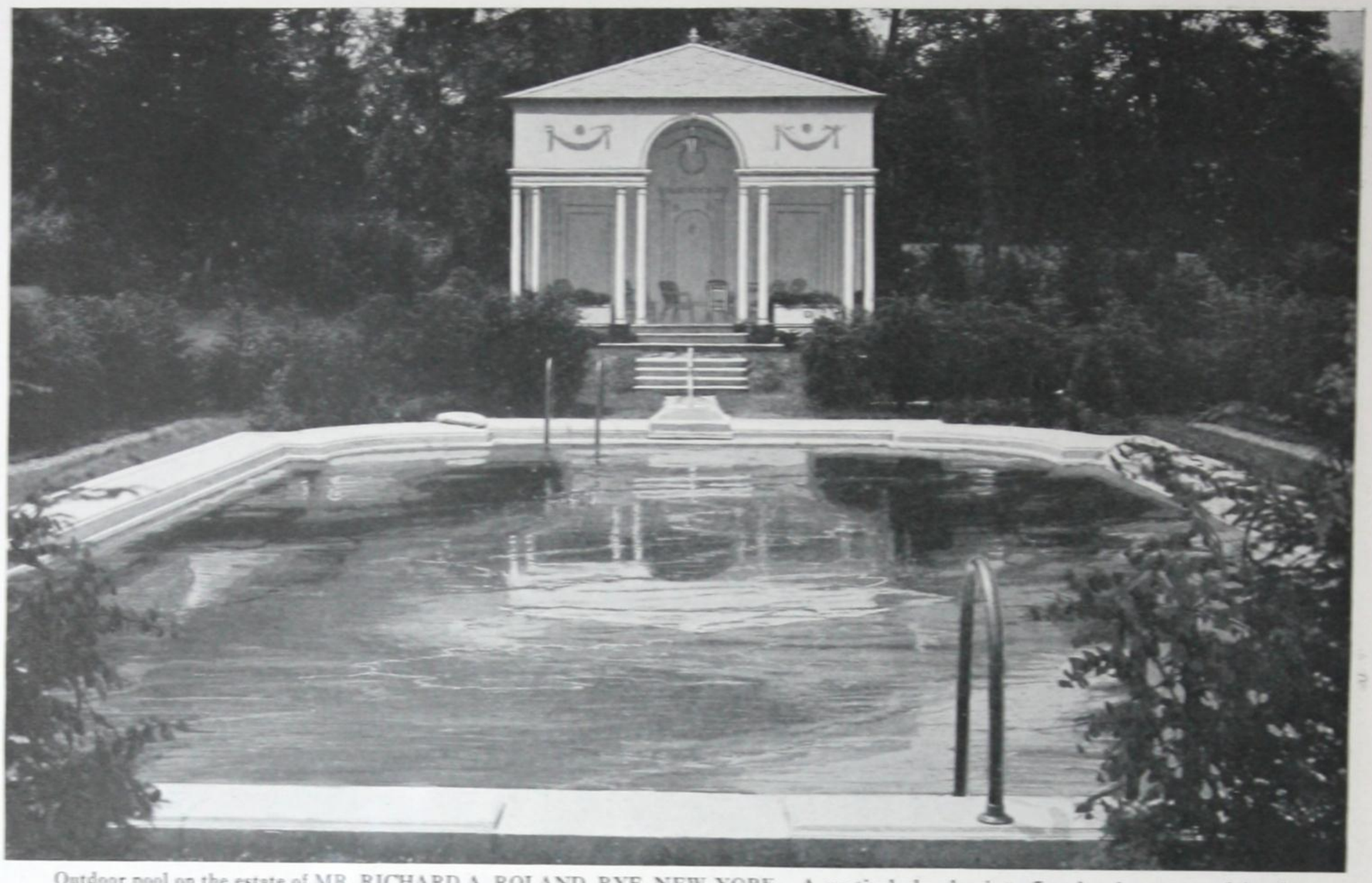
THE ROBERT A. BREWSTER ESTATE, MT. KISCO, N. Y. Black shadows and heavy shrubbery give beautiful contrasts against the whiteness of the rail and fountain. In the house, dark trimmings give the same value against the severe white background of the walls. Medusa White Cement was used to obtain these startling effects. In the pool, below, Medusa Waterproofing was used to make certain that there would be no seepage of water. Messrs. De Lano & Aldrich, New York, Architects.



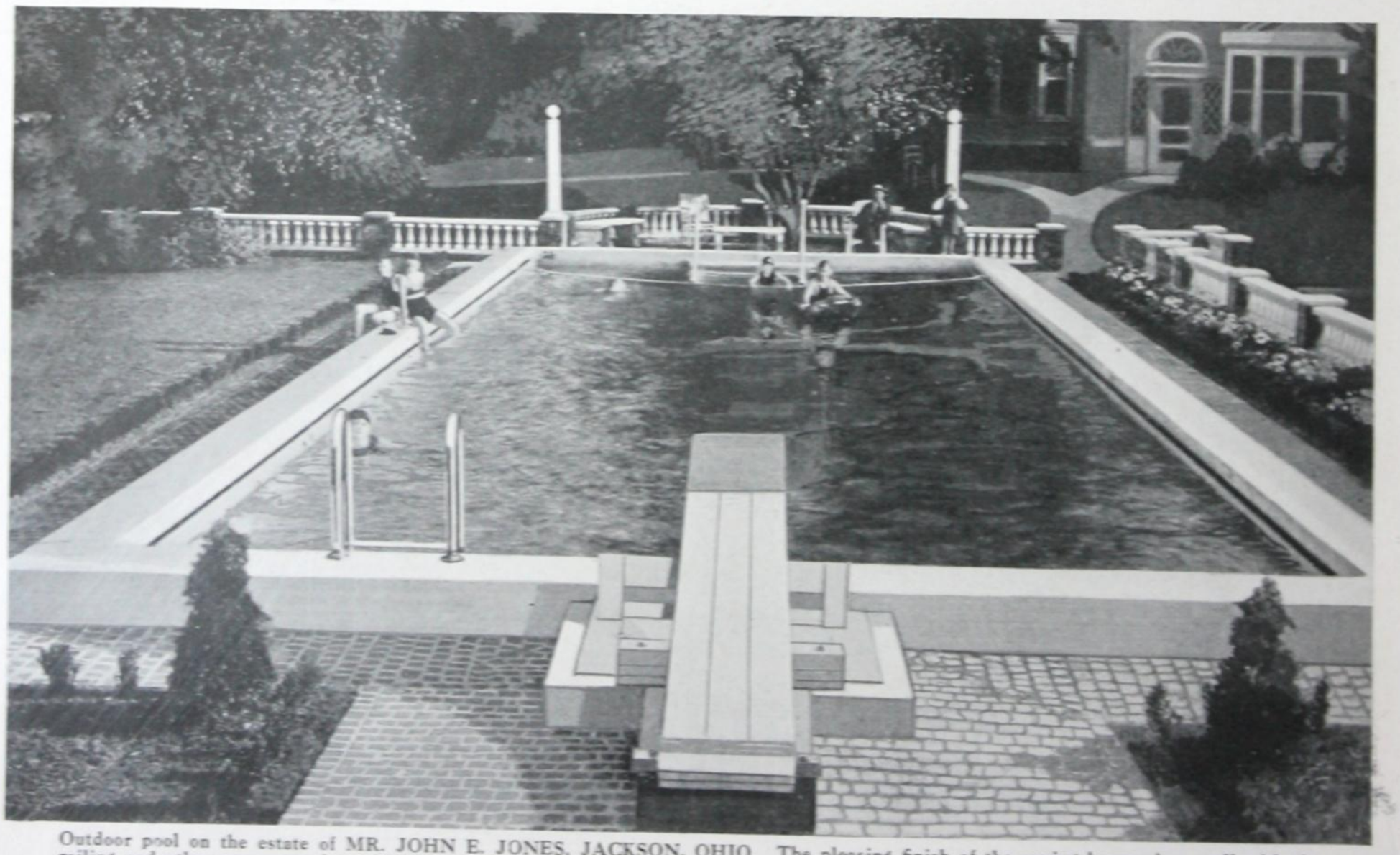
Pool on the estate of MR. B. G. WORK, OYSTER BAY, LONG ISLAND, N. Y. To carry out owner's and architects' plans, it was necessary to level down the top of a hill and grade to retaining walls. Medusa Integral Waterproofing was used in cement construction of pools, etc. Messrs. Delano & Aldrich, N. Y., Architects; the Central Building Co., Worcester, Mass., General Contractors.



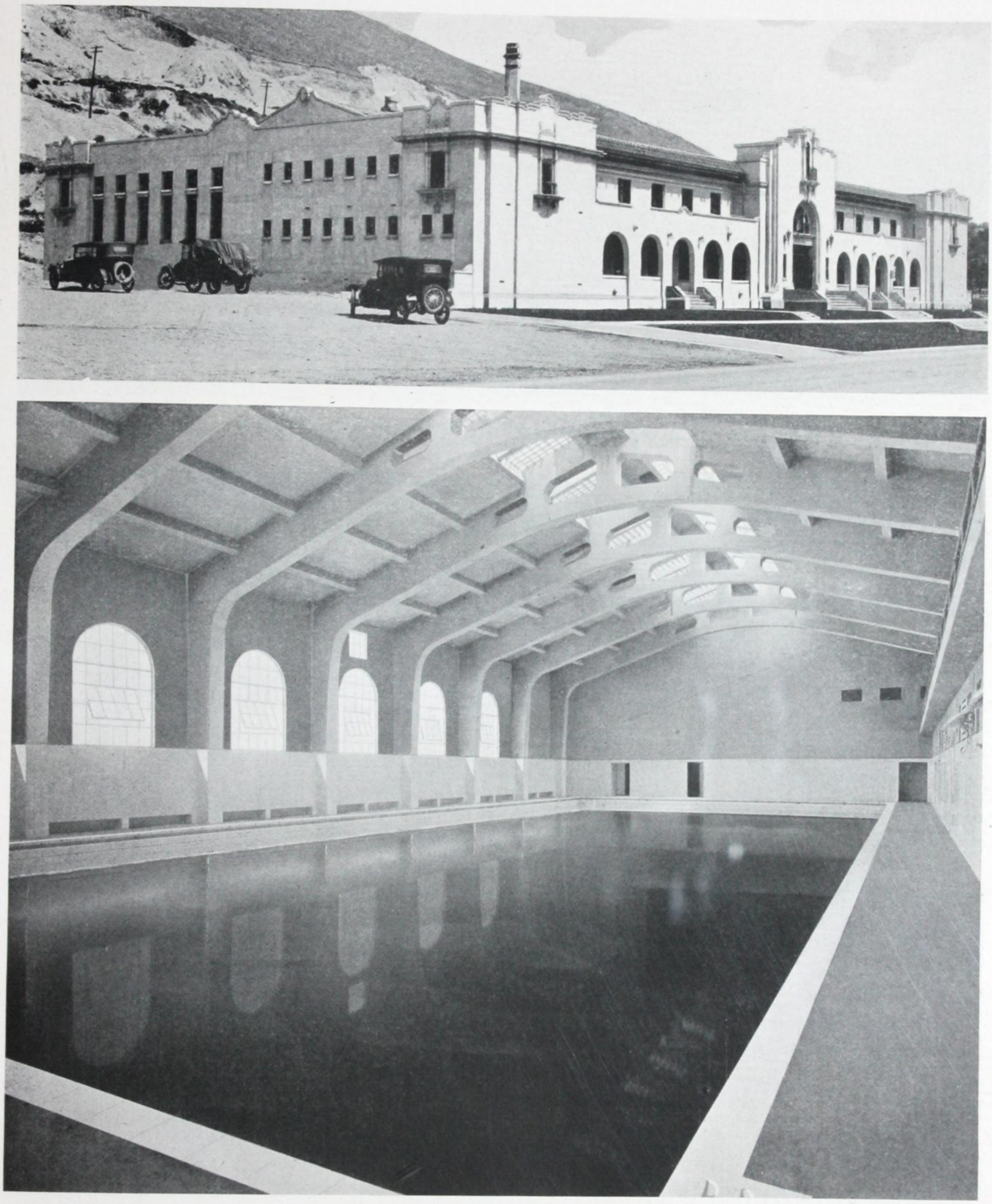
Ornamental pool on the estate of MR. JAMES STANLEY JOYCE, MIAMI, FLORIDA. The ornamental work is of precast cement or cast stone, using Medusa Stainless White Cements; the vista across the water is most charming. Messrs. Kiehnel & Elliott, of Pittsburgh and Miami, Architects; concrete work by John B. Orr, Miami.



Outdoor pool on the estate of MR. RICHARD A. ROLAND, RYE, NEW YORK. A particularly pleasing effect has been secured by the architect by locating the tea house just beyond. The coping is of granite, pointed with Medusa White Cement mortar. The entire pool, 30 x 50 feet, is lined with blue Faience Tile. Mr. Dwight James Baum, New York, Architect. Wm. H. Jackson, New York, tile setters.



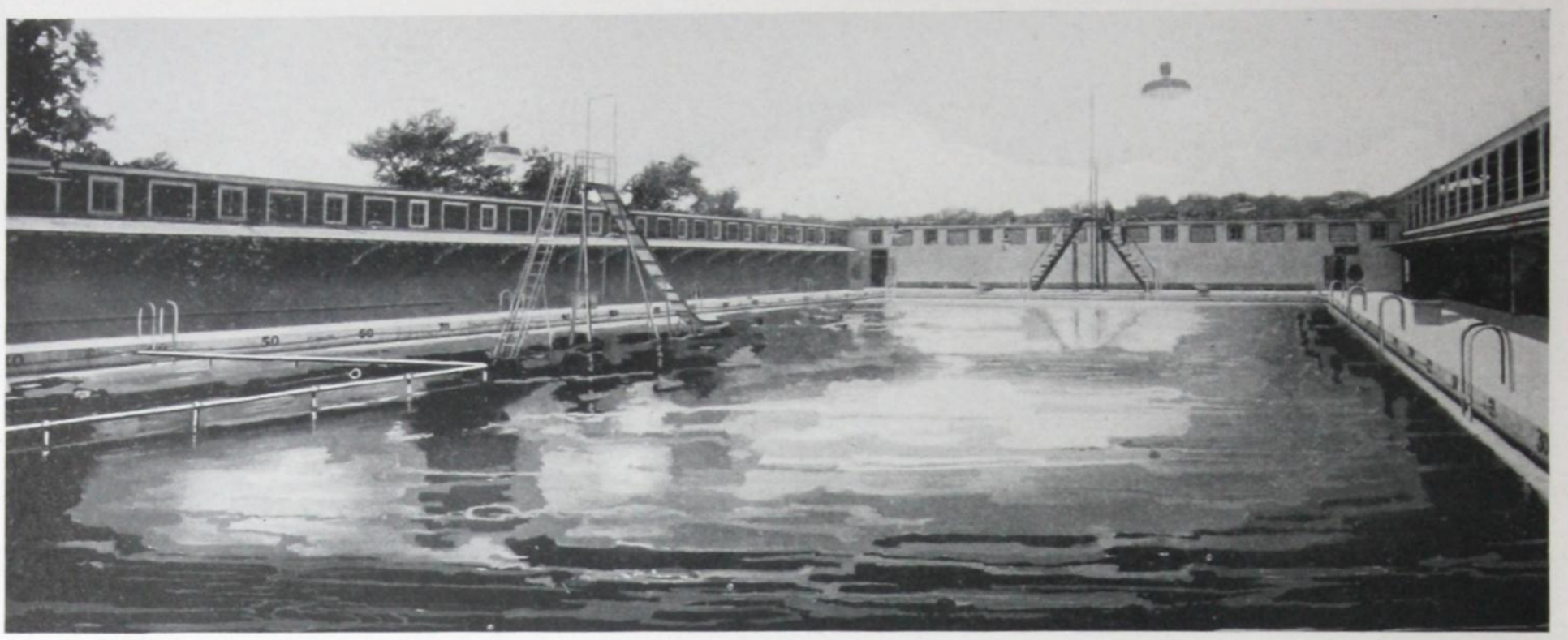
Outdoor pool on the estate of MR. JOHN E. JONES, JACKSON, OHIO. The pleasing finish of the coping harmonizes well with the railing and other ornamentation. Truly an ideal spot from which to observe "the end of a perfect (August) day." Note the comfortable and inviting seats at opposite end of pool.



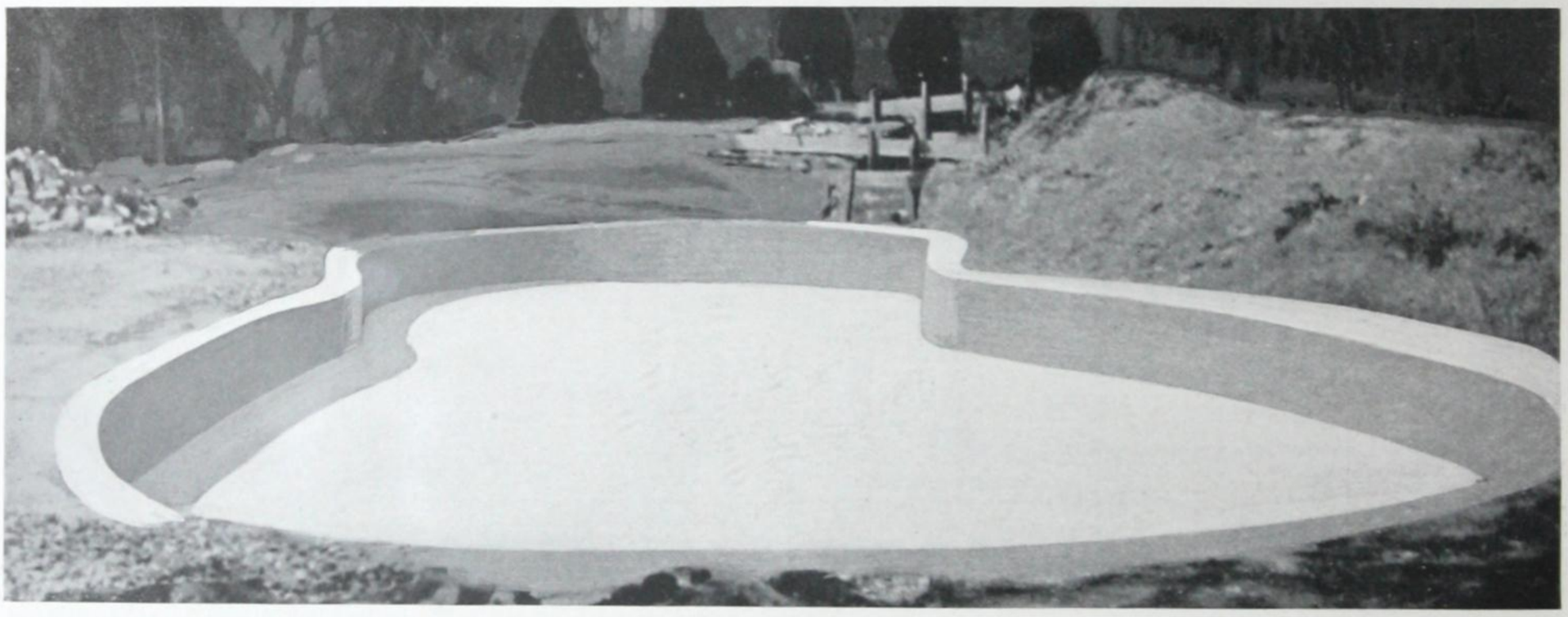
Warm Springs Natatorium, Warm Springs, Utah

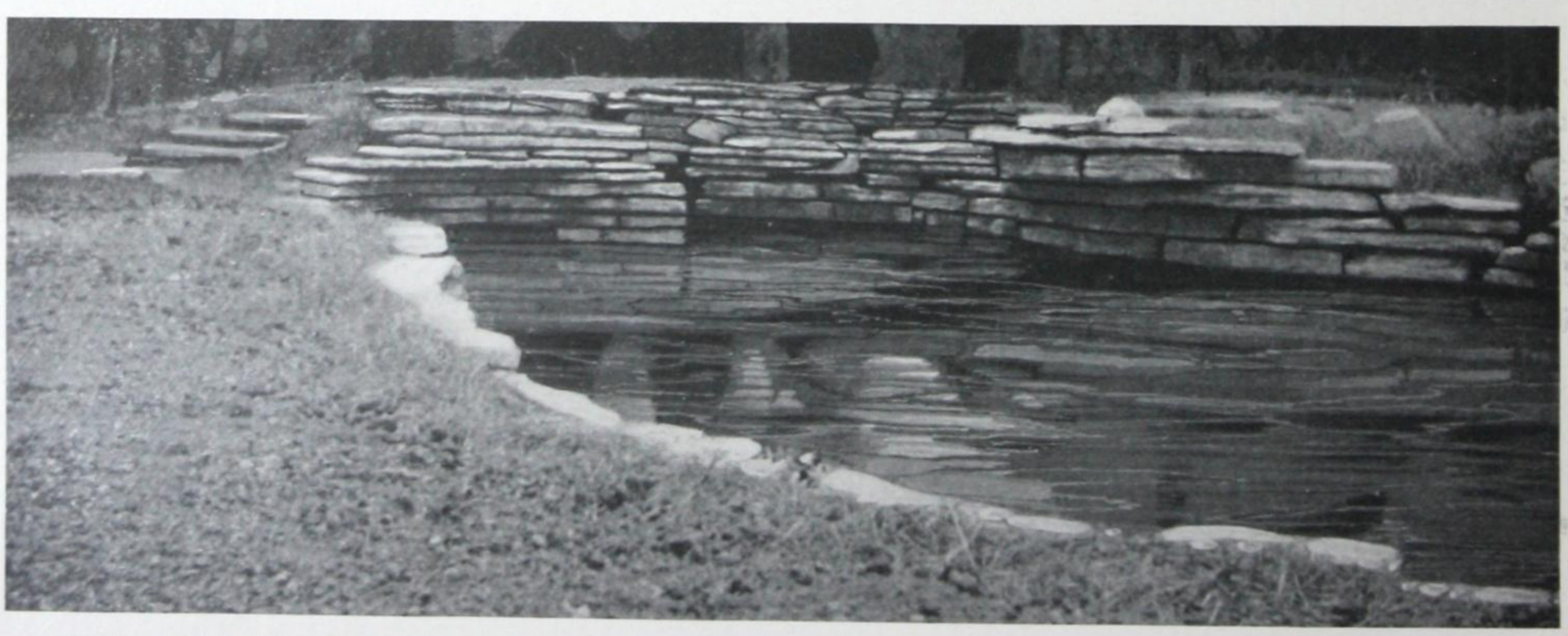
In order that the beautiful white of this building should forever remain unstained and damp-proof, the stucco was waterproofed with Medusa Waterproofing.

The bottom picture shows the pool and interior stucco work. Both are protected from dampness and moisture by the use of Medusa Waterproofing. Morrison and Merril Company, Salt Lake City, Utah, Contractors.

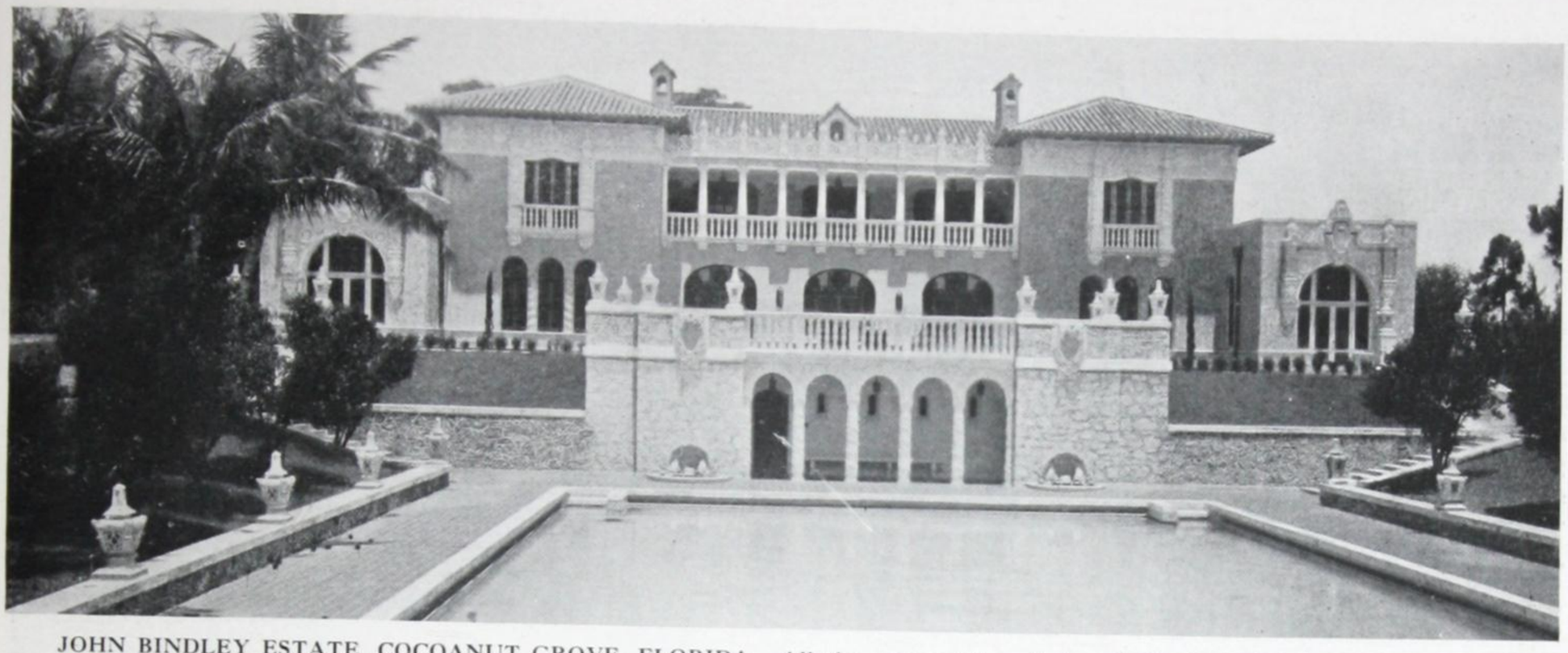


POOL, CHATTANOOGA, TENN. Medusa White Waterproofed Cement was used in the walls of the swimming pool. Plain White Medusa was used in the front and rear of the main building. Hibbler-Barnes Company, Chattanooga, Dealers.

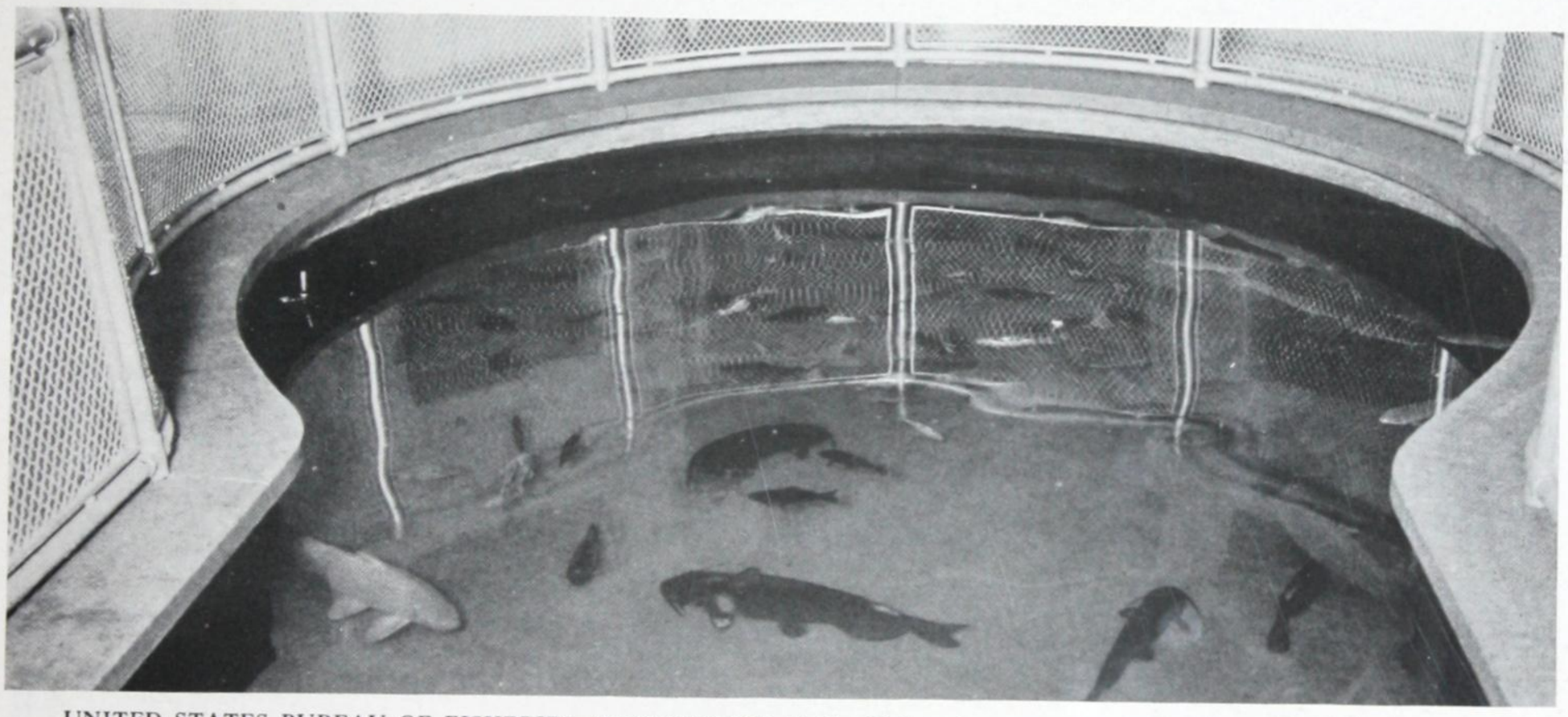




GARDEN POOL, ESTATE OF MR. W. H. TITUS AT GLENCOE, ILLINOIS. This artificial pool was first constructed of Medusa Waterproofed Concrete, as shown above. The limestone was laid up in Medusa Waterproofed Cement, with the weathered edge exposed to imitate natural rock formation. The joints were deep raked to conceal the mortar. Altogether an excellent example of what can be accomplished by an ingenious engineer and the correct materials. Edison L. Wheeler, Chicago, Architect.



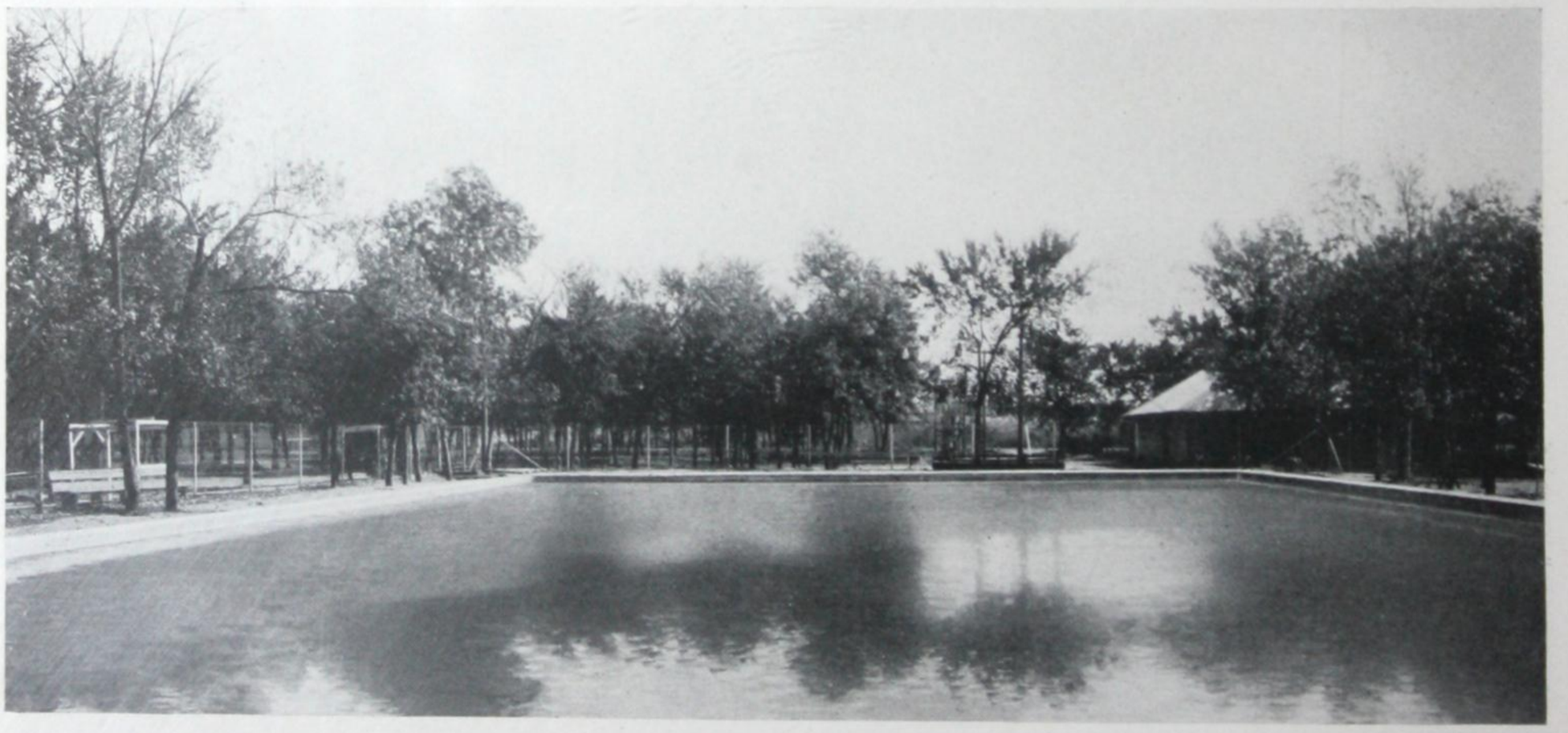
JOHN BINDLEY ESTATE, COCOANUT GROVE, FLORIDA. All the ornamental work done in Medusa White Cement protected with Medusa Waterproofing. Messrs. Kiehnel & Elliott, of Pittsburgh, Pa., and Miami, Florida, Architects. Mr. John B. Orr, Miami, Florida, designed and executed all of the ornamental work.



UNITED STATES BUREAU OF FISHERIES, WASHINGTON, D. C. Fish pool waterproofed with Medusa Integral Waterproofing. When photographed this pool had been in service for about 7 years. Frederick Drew Company, Contractors. Medusa Waterproofing supplied by the National Mortar Company, Washington.

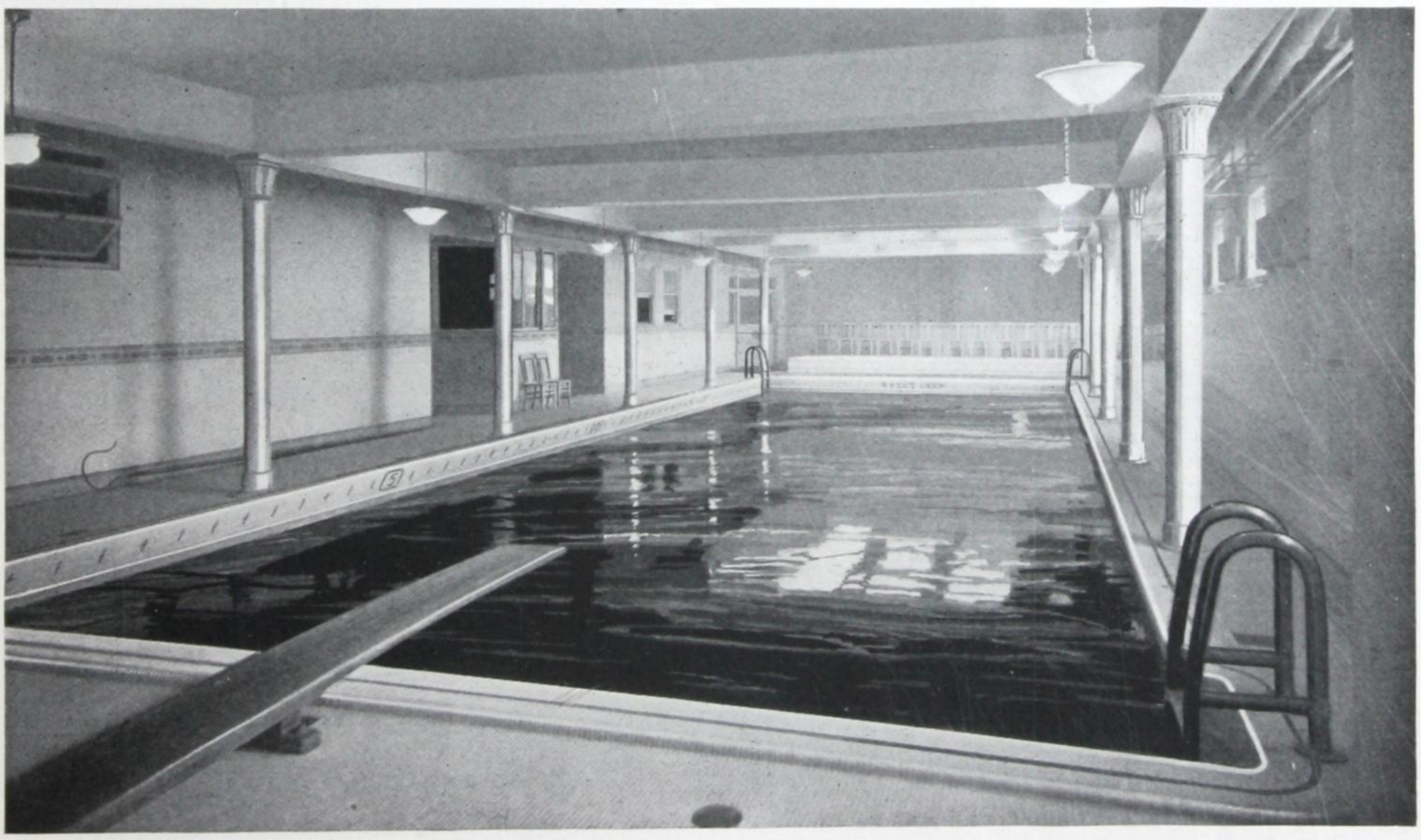
NATATORIUM, SAGINAW, MICHIGAN. This is an open-air pool, located close to the Saginaw River, and covering an area 60x104 feet. Filtered water is supplied through a mechanical filter having a capacity of 200 gallons per minute. Medusa White Cement was used for exterior finish of tower, walls, steps and floor.
Medusa Waterproofing was used in the pool and in the 12,000 gallon storage tank. Messrs. Cowles & Mutscheller, Saginaw, Architects; Northern Construction Co., Milwaukee, Contractors; Medusa materials furnished by Ripslinger Bros., Saginaw.

NELA PARK RESERVOIR, NATIONAL ELECTRIC LAMP ASSOCIATION OF GENERAL ELECTRIC COMPANY, CLEVELAND. This great million gallon reservoir is 120 feet in diameter and 11 feet deep. Medusa Waterproofing was used to prevent leakage. Outside contamination cannot get in for the same reason that the water cannot get out. Messrs. Wallis & Goodwillie, New York City, Architects. The Austin Company, Cleveland, Builders.

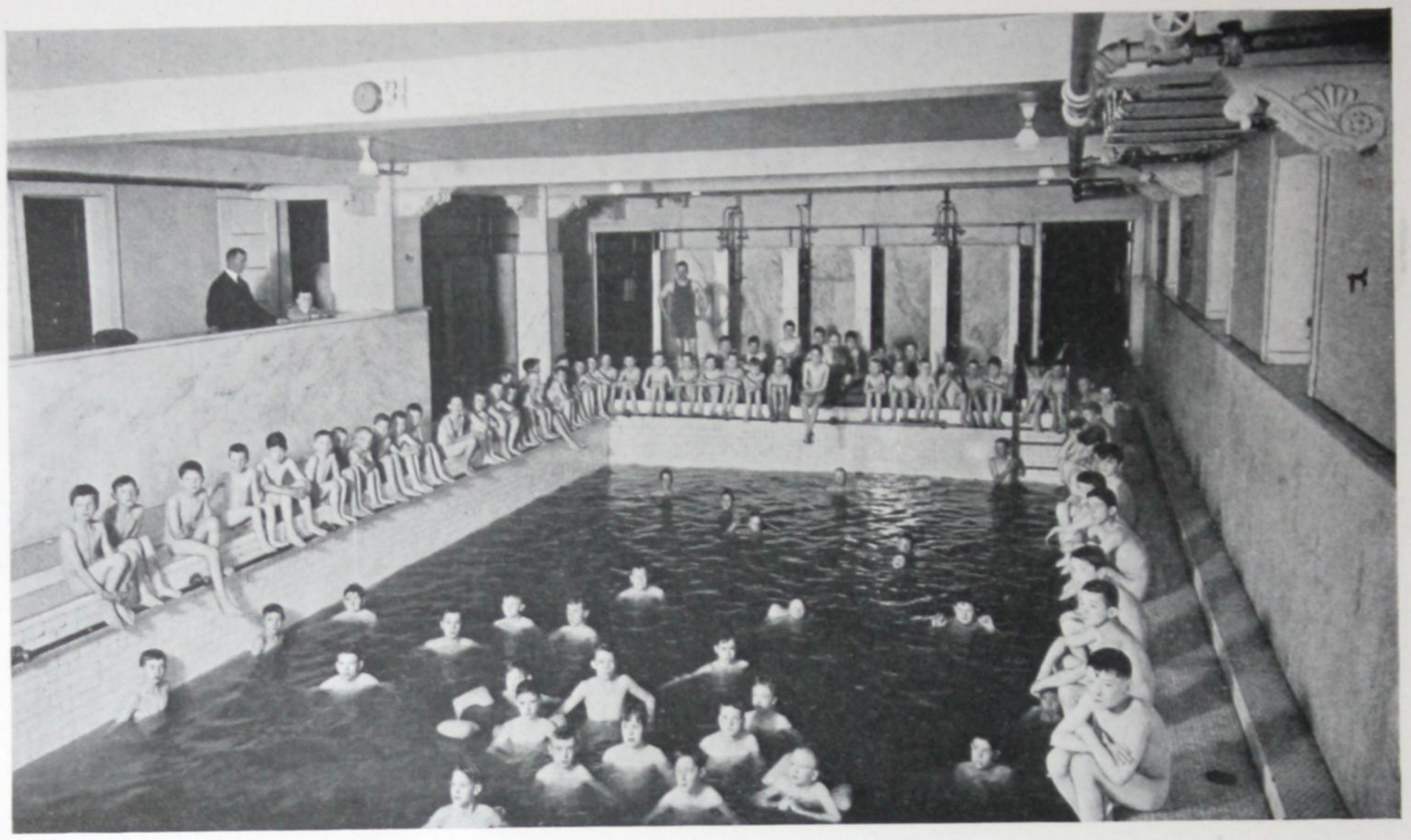


OUTDOOR SWIMMING POOL, HASTINGS, NEBRASKA. This attractive pool, located in one of the city parks, is lined with Medusa Stainless White Cement, giving it a clean, inviting touch naturally appreciated by the public. Materials were supplied by the Western Brick & Supply Co., of Hastings.

SWIMMING POOL, CULVER MILITARY ACADEMY, CULVER, IND. A wonderful daylight pool in what is perhaps the country's best known school for boys. This beautiful pool was completed in 1917. Medusa Waterproofing was used in the construction. Mr. Albert Knell, St. Louis, Architect, wrote in 1921: "No defects, satisfied it will remain perfect."

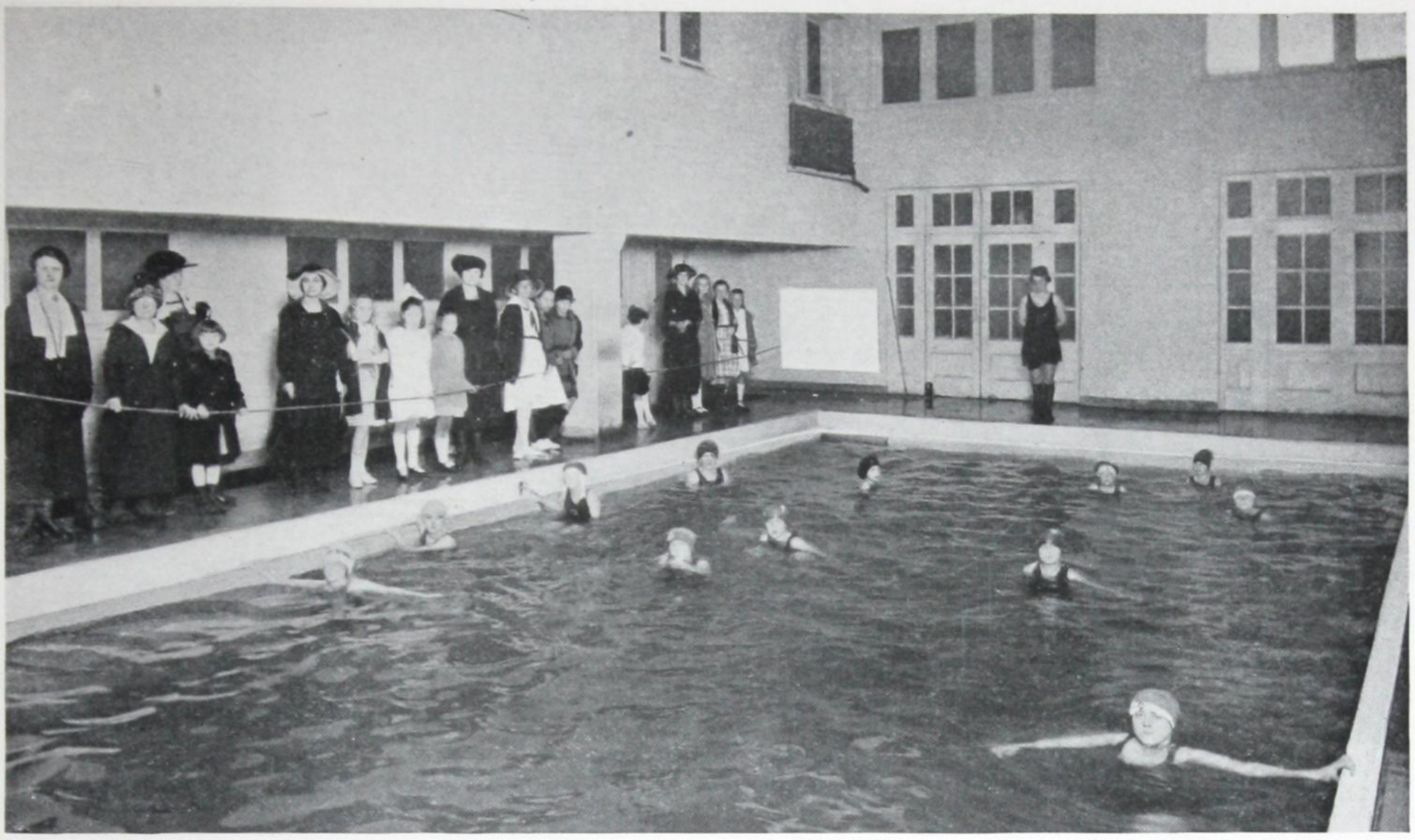


SWIMMING POOL, ELKS' CLUB, KENOSHA, WIS. Medusa Waterproofed Cement used in mortar, backing for tile, etc. Messrs. Robert A. Messmer & Bro., Architects, Milwaukee.

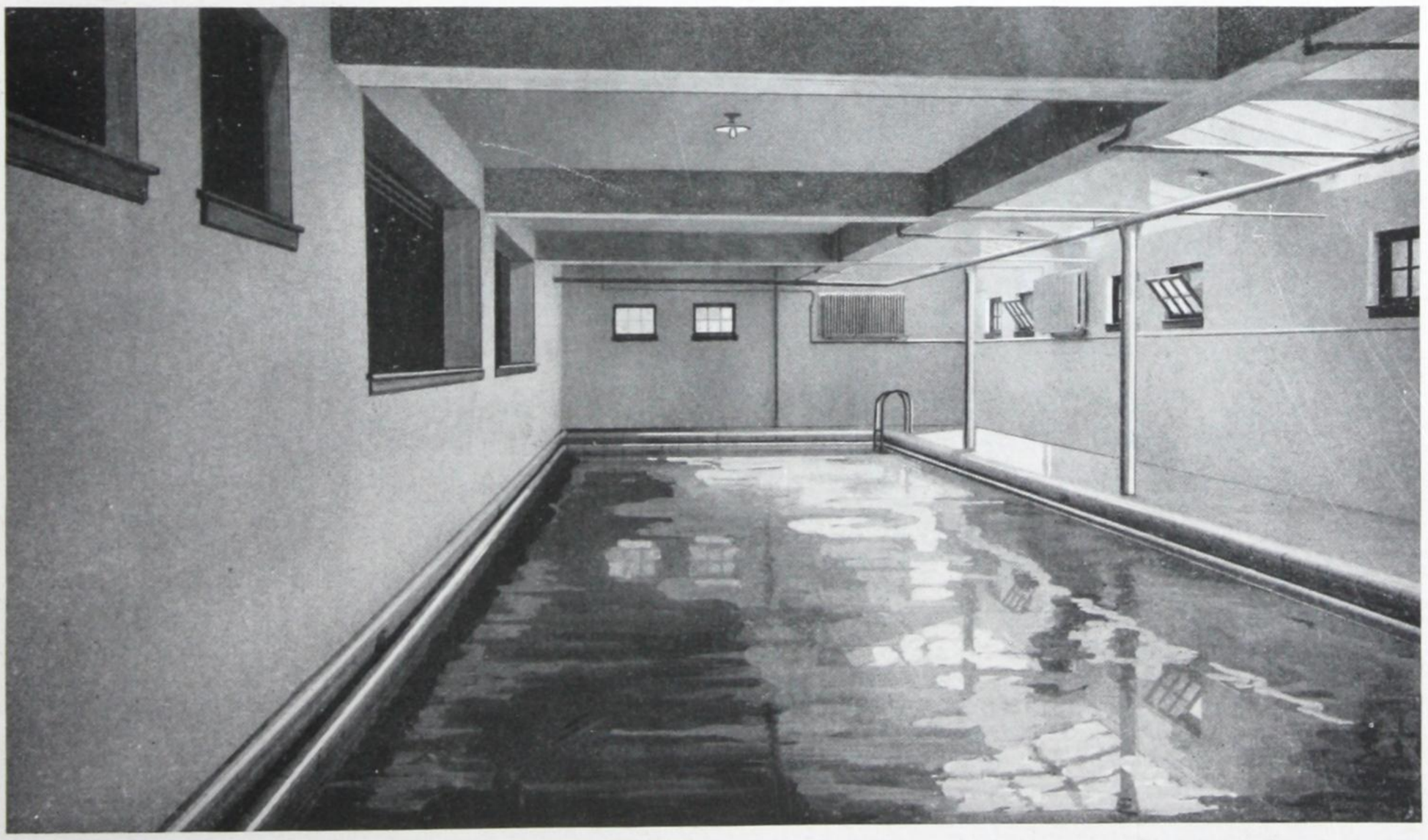


SWIMMING POOL, Y. M. C. A., WHEELING, W. VA. Room marble wainscoted; pool lined with white tile; waterproofed with Medusa Waterproofing. Mr. M. F. Giesey, Wheeling, Architect.

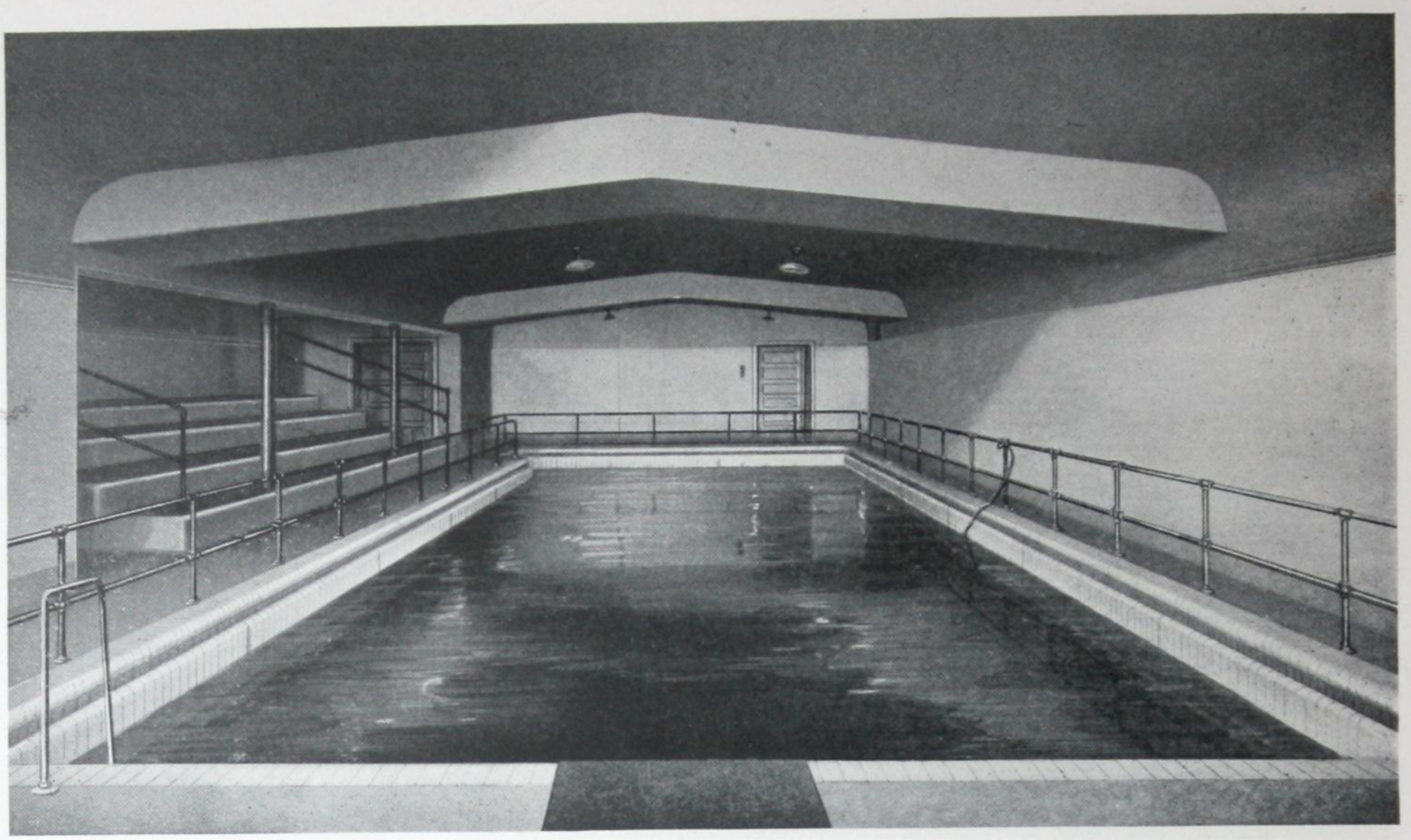
SWIMMING POOL, Y. M. C. A., MERIDEN, CONN. Messrs. Jallade, Lindsay & Warren, New York, Architects. H. Wales Lines, Contractor.



Y. W. C. A., OAKLAND, CALIFORNIA. Medusa White Cement used with Medusa Waterproofing. Builder, D. B. Farquharson, San Francisco, California.

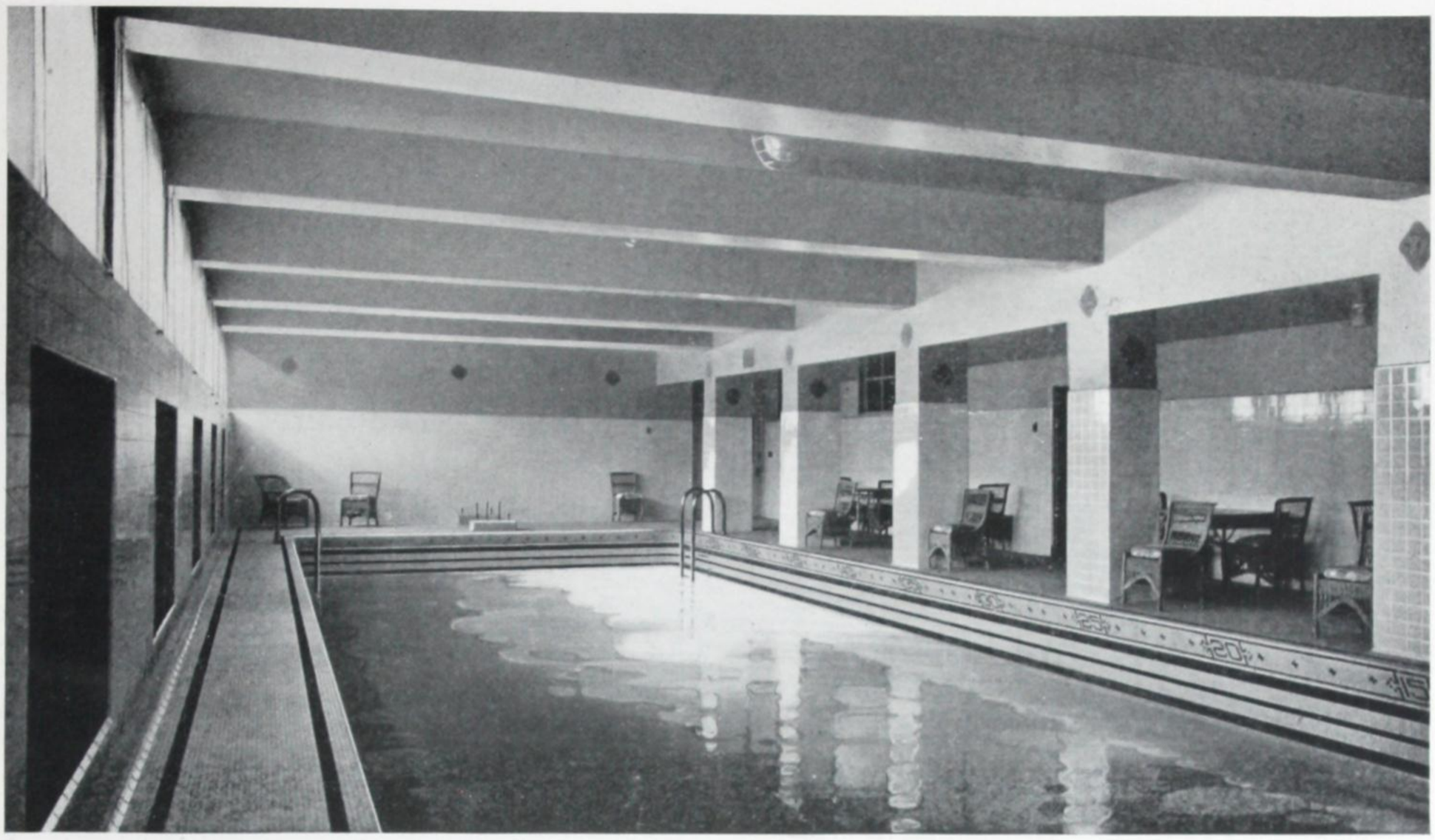


SWIMMING POOL, ROCKFORD ILLINOIS BOYS' CLUB. In writing recently they had the following to say: "Waterproofing effect on tank, walls, etc., is perfect." Medusa Waterproofing was used in the construction of the tank, walls and pool.

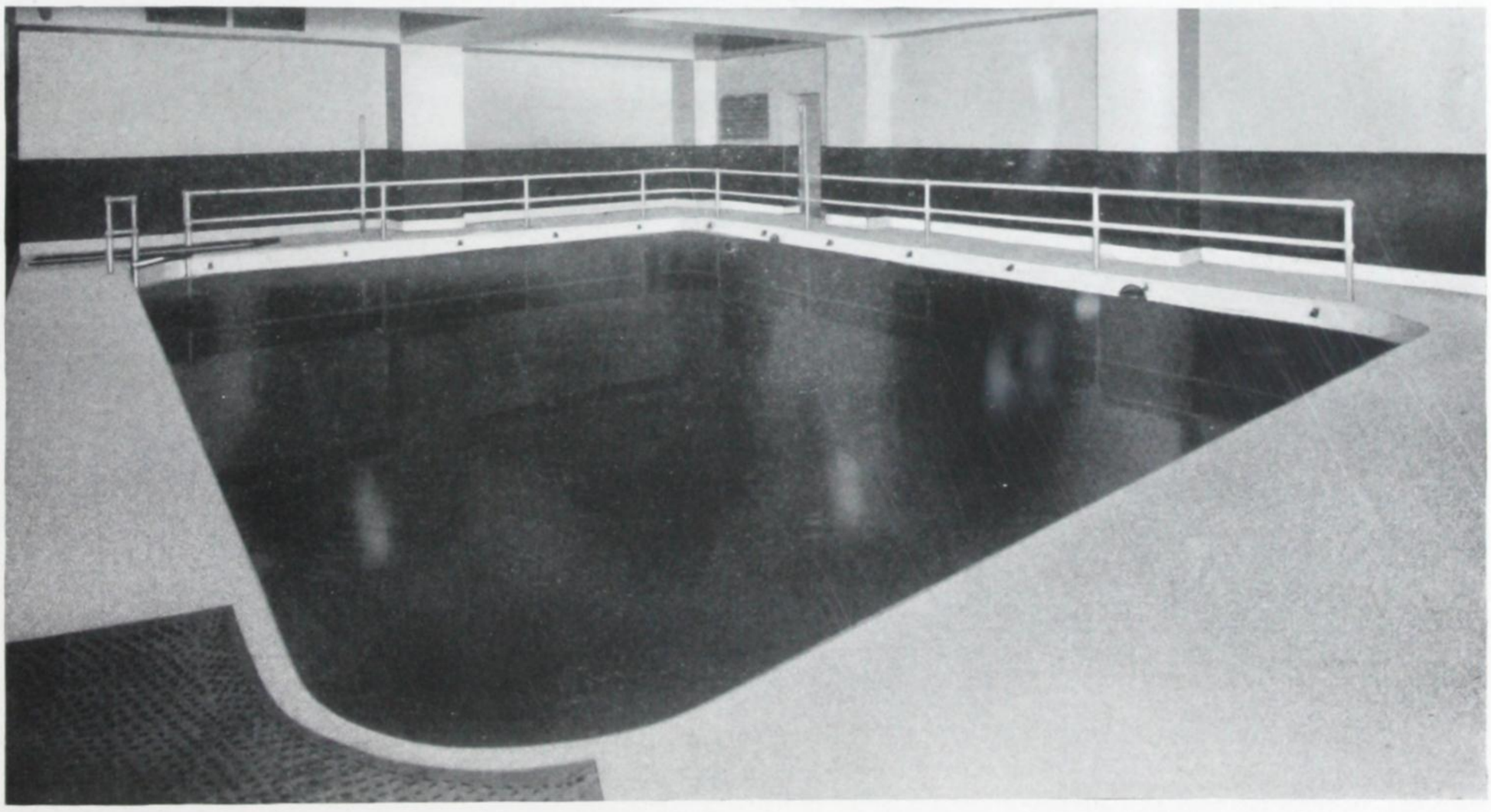


SWIMMING POOL IN HIGH SCHOOL, LOGANSPORT, IND. Size 20 x 60 feet; depth varies from 4 ft. 3 in. to 8 ft. 9 in. Medusa Waterproofed Portland Cement. Messrs. Herbert Bass & Co., Indianapolis, Architects. Barnes Bros., Logansport, Contractors; Medusa materials furnished by W. M. Smith & Co., Logansport.

SOULARD PUBLIC BATHS, ST. LOUIS. Pool, floors, steps and walls surfaced with Medusa Stainless White Cement and Medusa Waterproofed Cement. Mr. H. W. Powers, Architect. Kellerman Contracting Co., General Contractors.



SWIMMING POOL, Y. W. C. A., HARTFORD, CONN. Medusa Waterproofing used in mass concrete. Mr. Louis Jallade, New York, Architect. The H. Wales Lines Co., Meriden, Conn., General Contractors.



SWIMMING POOL, RICE HOTEL, HOUSTON, TEXAS. This practical little pool was built for the accommodation and enjoyment of guests of the hotel. The pool is lined with a coat of Medusa Waterproofed White Cement, giving absolute imperviousness to seepage or leakage of any kind. A. C. Finn, Architect, Houston, Texas. W. E. Humphreville Co., Contractors, Houston, Texas.

Municipal Bathing and Wading Pools
Toledo, Ohio

The illustrations at the top of these two pages are different views of the first municipal bathing pool built in Toledo, Ohio. It was constructed in 1912. Medusa Waterproofing was used throughout in the walls and floors.

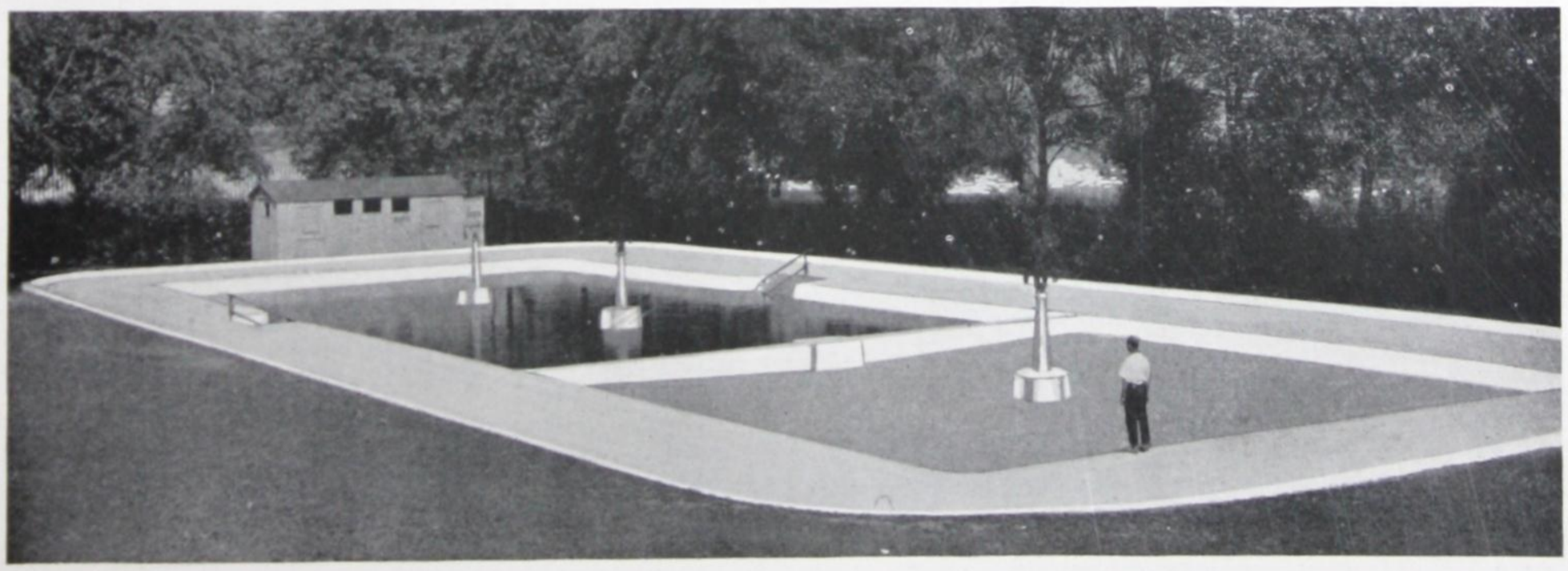
Later when the city of Toledo constructed additional pools at Riverside and Navarre Parks, Medusa Waterproofing was specified again, this time on the basis of satisfactory service.

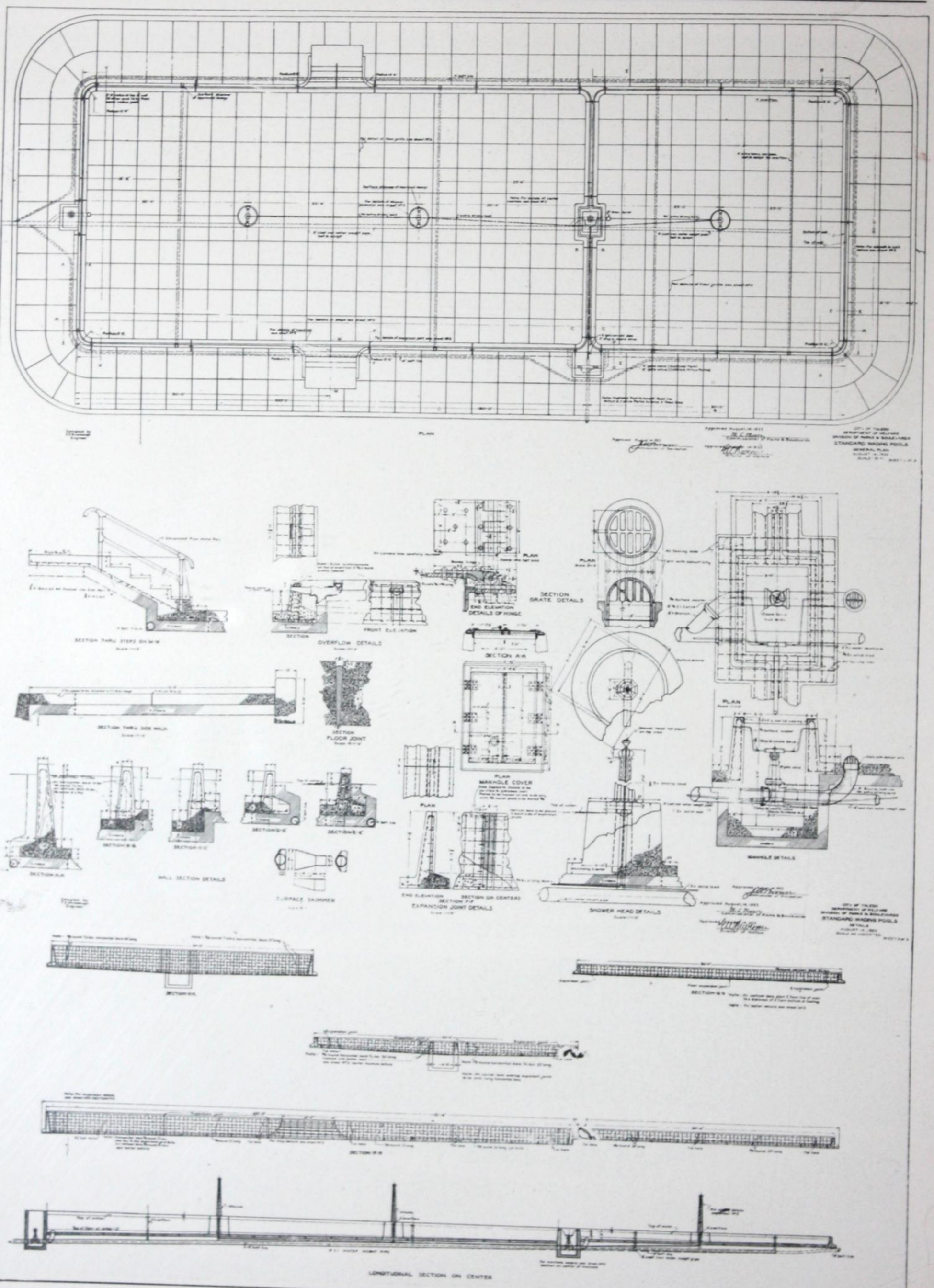
Although completed many years ago these pools still are giving uninterrupted use and contribute annually to the happiness of hundreds of Toledo's children. The concrete work, waterproofed with Medusa Waterproofing is still in excellent condition, no leaks having developed—more evidence of the wonderful waterproofing qualities of Medusa Waterproofing.

These pools were designed by E. F. Wirebaugh, Engineer for the Board of Park Commissioners. Shillinger Brothers Company, Toledo, were the contractors. The City Park Pool is 180 feet long by 60 feet wide, and from one to four feet deep. It is divided into two basins, one for the little folks and the deeper one for the older children. A 12 foot concrete walk surrounds the entire pool.

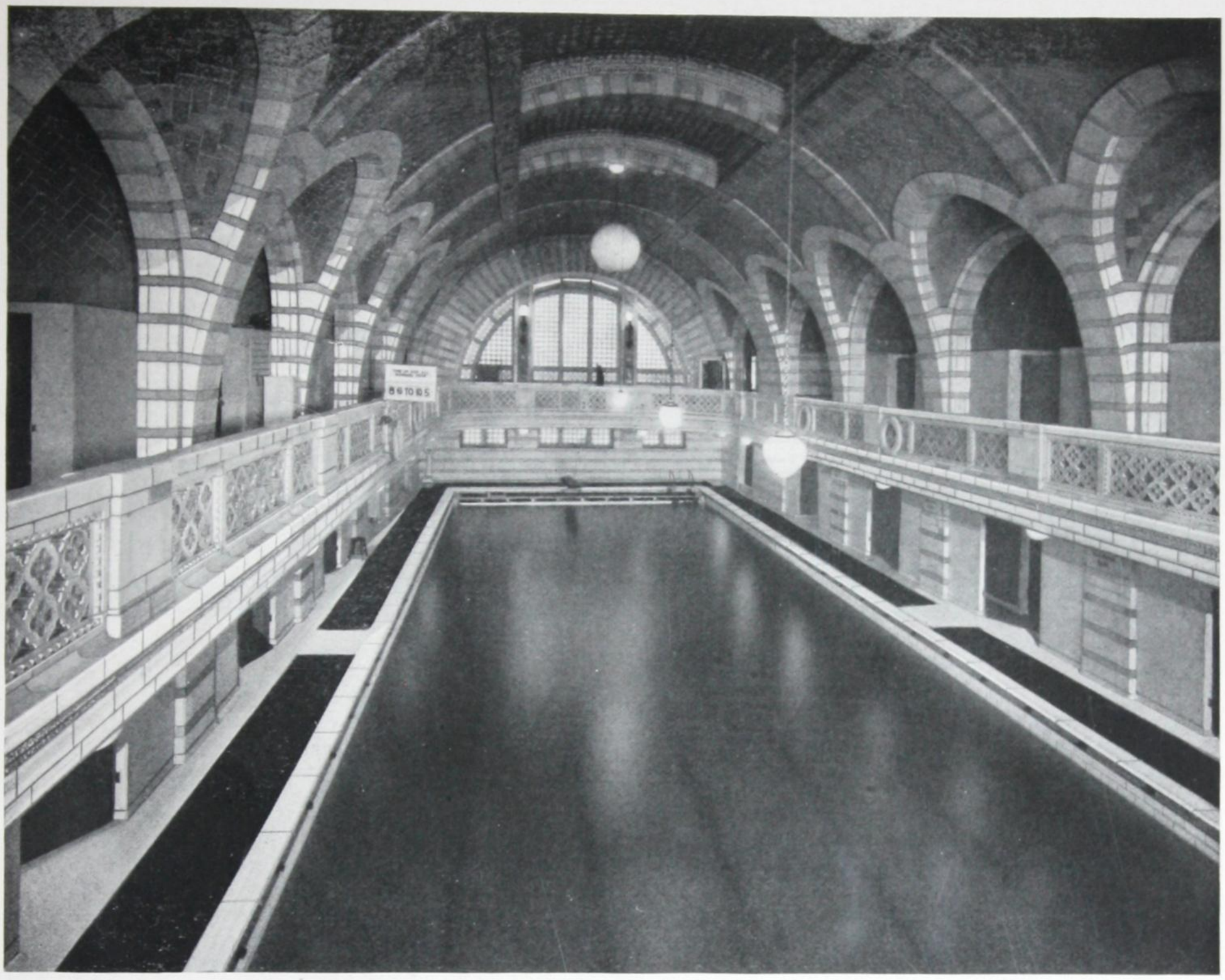
The second picture on the opposite page is of the Navarre Park Pool and the bottom one is of the Riverside Park Pool.

Through the courtesy of The Department of Welfare, we are pleased to reproduce on the next succeeding page a number of plan and detail drawings showing the construction of Standard Wading Pools for the City of Toledo.





Page ninety-six **Details of Municipal Pools at Toledo, Ohio. See pages 94 and 95.**

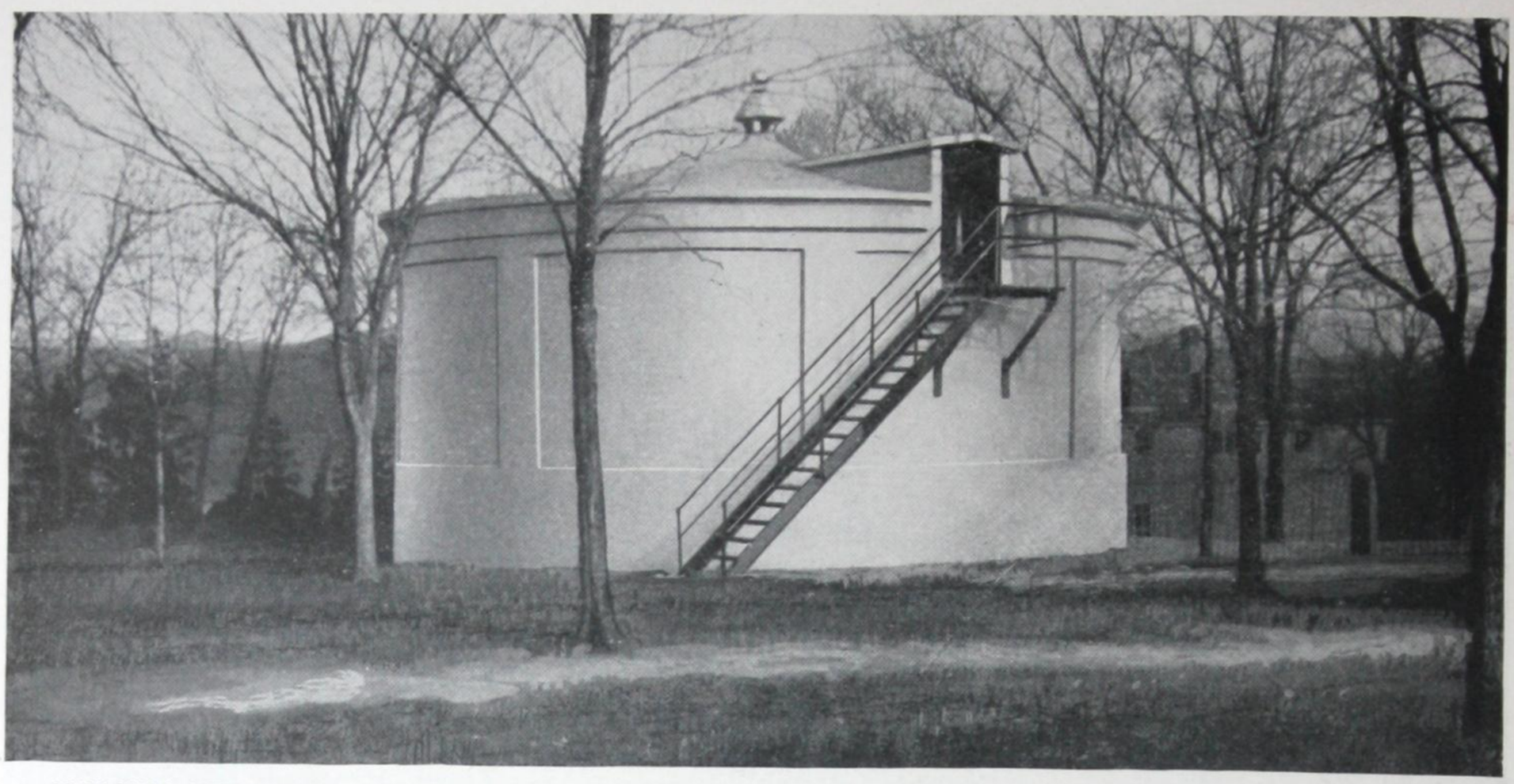


Pittsburgh Natatorium Swimming Pool, Pittsburgh, Pa.

Permanently Waterproofed 18 years ago with Medusa Waterproofing.

This pool is 90 feet long by 30 feet in width and holds 135,000 gallons of water. The great arched ceiling is forty feet above the water and recedes to a group of small arches on either side where are located the lockers or dressing rooms. At either end of the balcony, and on each side of the mezzanine floor are gathering places for spectators.

The pool is of reinforced concrete, lined with marble and glazed terra cotta, cream and green being the predominating colors. After a very thorough test Medusa Waterproofing was used in the walls and floors, and the Pittsburgh Building Company, New York, inform us that it has remained water-tight since its construction. F. A. Burdett of New York City was the Engineer in charge. Mr. Grosvenor Atterbury, New York City, Architect.



NEW ULM, MINNESOTA, water reservoir. The city engineer in constructing this reservoir in 1914 used Medusa Waterproofing. When writing us recently he had the following to say about the effectiveness of the waterproofing, "In 1914 we built a circular reservoir 90,000 gallons capacity, bottom of which is level with the surface of the ground, and used Medusa Waterproofing. At this writing I am pleased to state that no sign of leakage has occurred, after eight and one-half years' continuous service both winter and summer."

MASONIC TEMPLE, TOPEKA, KANSAS. Medusa Waterproofed White Cement used in setting all of the stone work. Also used in back-plastering all stone work. Frank C. Squires and Thomas W. Williamson & Company, Topeka, Architects. F. M. Spencer & Son, Topeka, Contractors.

SECTION VI

Concrete Building Blocks
Made with
Medusa Waterproofed Cement,
or Containing
Medusa Waterproofing

MORE concrete blocks will be sold in the future than in the past, for two main reasons.

First, because blocks nowadays are *better looking*. The old-fashioned and rather unattractive "rock-faced" block is being replaced with simpler and more tasteful designs that are attracting the better class of home-builders—whose demands in the future will mean a new, profitable market for local block-makers.

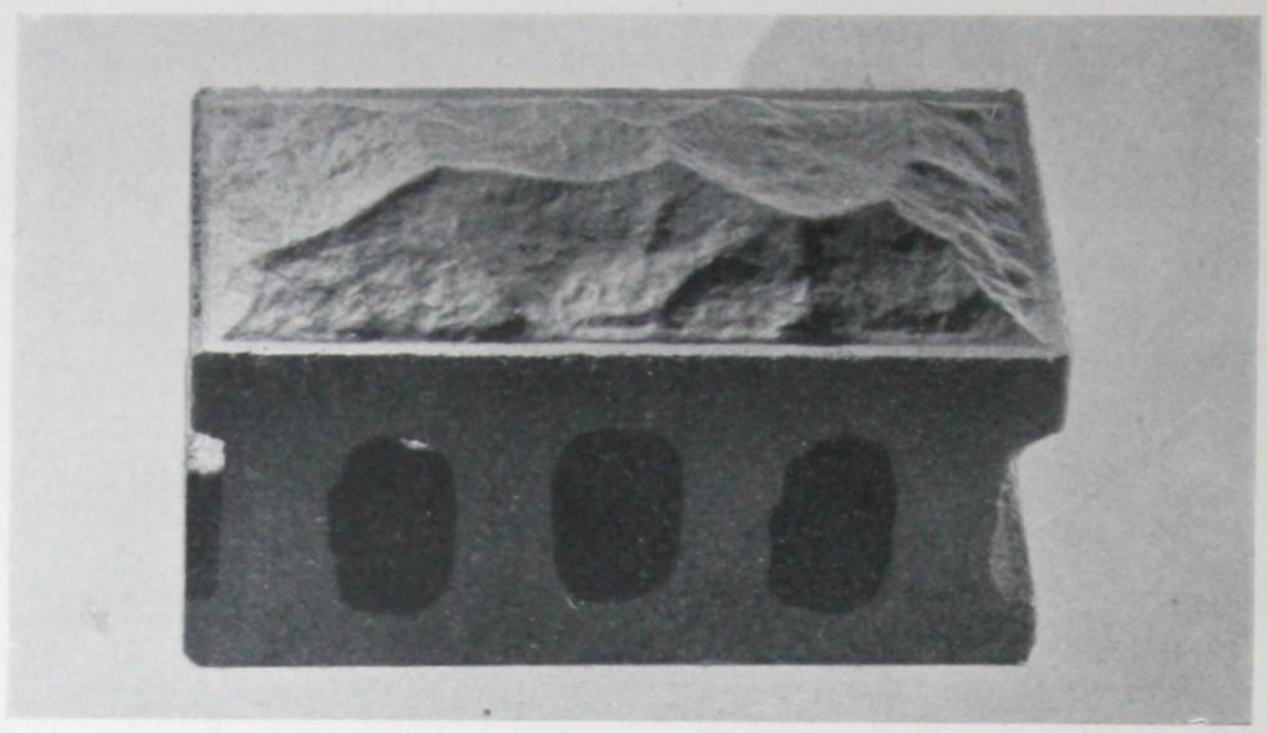
Second, because, through the use of Medusa Waterproofing, concrete blocks are now giving *better service*.

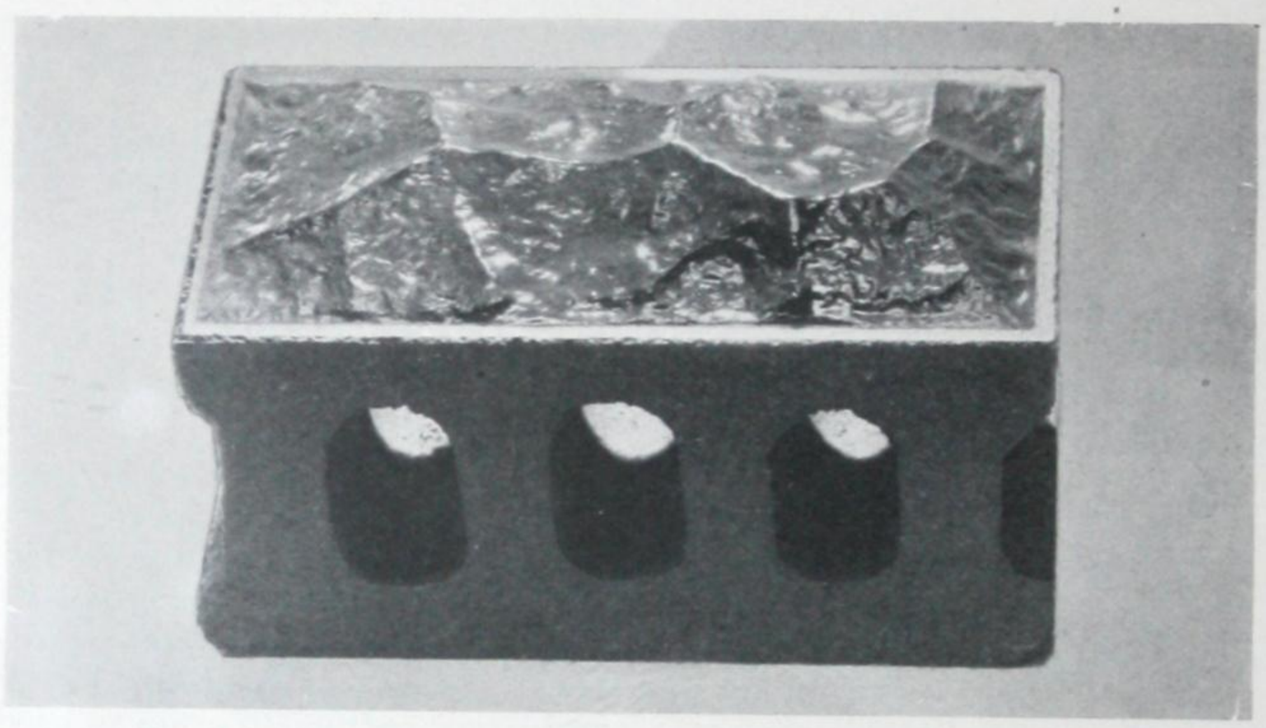
Ordinary plain concrete blocks, no matter how carefully and honestly made, are bound to absorb water. Blocks made with Medusa Waterproofing absolutely cannot take up any water at all—either when used for foundation work and in contact with ground moisture, or when used for the upper courses of the building and exposed to driving storms.

As shown on a following page, the use of Medusa Waterproofed Cement, or of Medusa Waterproofing added to plain Portland cement, adds but a trifle to the cost of each block. Yet the experience of many successful block manufacturers is that these waterproofed blocks are regarded by their customers as a special brand, and readily command an extra price that shows a handsome profit over the price received for plain blocks.

There is practically no added trouble to the block-maker in using either Medusa Waterproofed Cement or Medusa Waterproofing.

A fair trial of either product will prove this, and will open the way to a more solid and permanent trade among customers who recognize quality and are willing to pay to get it.





What Happens When You Pour Water on Plain and Waterproofed Cement Blocks

("Rock-faced" block were used because their surfaces made the demonstration in this experiment more effective. However, as previously stated, The Sandusky Cement Company prefers to encourage the plainer designs.)

These two blocks were pulled out of the regular day's run at the plant of W. R. Hoag, Cleveland. The lower picture is of a block made with Medusa Waterproofed Portland Cement (containing 2% Medusa Integral Waterproofing added at the mill to Medusa Gray Cement, and thoroughly ground in). The upper one is made of plain Portland cement.

Equal amounts of water were poured over each block and photographs taken immediately.

The plain Portland cement block, (top picture), "drank up" its water almost instantly. The Medusa Waterproofed Cement block shed off all that would run off, while the rest of the water gathered in tiny pools in the hollows of the surface, all over the top of the block. *Every one of the bright spots shown in the picture is water that Medusa Waterproofing kept the concrete from soaking up.*

These are genuine "undoctored" photographs. Nothing whatever has been done to either of them to make our case any stronger. We will gladly send you a sample of Medusa Waterproofing so that you can make this interesting test for yourself, on your own blocks.

Specifications for Waterproofed Concrete Blocks

Cement

The cement used shall be Medusa Waterproofed Portland Cement, or a brand of equal quality which will pass all the requirements of the Standard Specifications of the American Society for Testing Materials.

Sand

The sand shall be well graded, clean, sharp, and free from clay, loam, vegetable or other deleterious matter.

Waterproofing

If Medusa Waterproofed Cement is not used, the blocks shall be waterproofed with Medusa Waterproofing, using 2% by weight of the cement.

Aggregate "A"

Coarse aggregate shall consist of clean lake pebbles, crushed rock, granite or trap rock, well graded so that the largest size will not exceed one-half of the thickness of the webs of the block. Not more than 5% shall pass a ¼" screen.

Aggregate "B"

Fine aggregate shall consist of sand or screenings from hard crushed rock, granite or trap rock, well graded, which shall pass thru a ¼" screen, and shall not contain more than 5% of silt, loam or impurities.

Proportions

The body of the blocks shall consist of one (1) part Medusa Waterproofed Portland Cement, 2½ parts fine aggregate and 3 parts coarse aggregate.

"B"—The facing of blocks shall consist of 1 part Medusa Waterproofed Portland Cement and 3 parts of clean sand.

A waterproofed White face block may be made by using 1 part Medusa Waterproofed White Cement and 2½ parts white aggregate composed of white sand or white marble dust.

Hand Mixing

Dampen the sand or aggregate, add the waterproofed cement, and mix as usual. When sand and Waterproofed Cement are uniformly mixed, add only enough water to secure proper consistency.

Batch Machine Mixing

Dampen the sand or aggregate, and put into the mixer with the Waterproofed Cement; allow mixer to run until the cement and sand are well mixed before adding additional water.

Consistency

Only sufficient water shall be used to permit the blocks to be removed from the molds without sagging or distortion.

A house of concrete blocks with facing made with Medusa Integral Waterproofing will be permanently dry. The blocks dry off immediately after a rain, instead of remaining dark and unsightly for a day or longer.

Mortar

Waterproofed concrete blocks should be laid up in a waterproofed mortar consisting of—

1 part Medusa Waterproofed Portland Cement.

1-5 part Hydrated Lime, by volume.

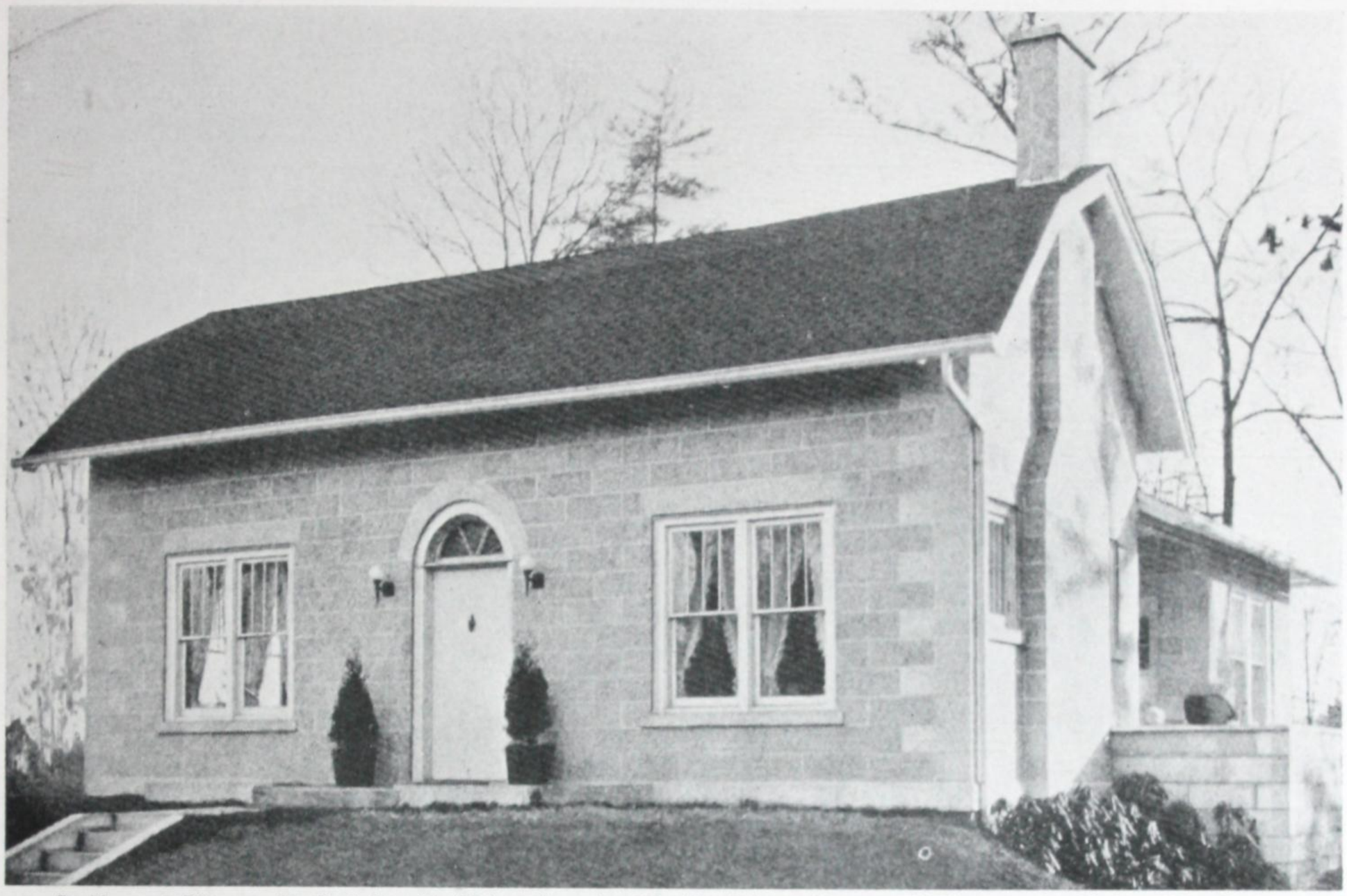
3 parts Sand.

General Material Specifications for Facing Gray Concrete Blocks with White

The facing is to be made of one part of Medusa Waterproofed White Portland Cement, and three parts of crushed white marble, all of which will pass a No. 8 sieve, with not more than 15% passing a No. 60 sieve.

Attractive suburban home. Concrete block faced with Medusa Waterproofed White Cement furnished by Miller-Nelson, Inc., Baltimore.

Garden front, residence of MR. GEORGE J. FEISS, CLEVELAND. Fountain and balusters of precast cement using Medusa Waterproofing to insure complete resistance to moisture. Mr. Charles R. Greco, Boston and Cleveland, Architect; Mr. B. A. Tripp, Cleveland, Landscape Architect; concrete work by Lennox-Haldeman Co., Cleveland.



Residence at Biltmore, N. C., built with "Felstone" produced by The Felstone Company of Biltmore, using Medusa White Cement.

NASH RESIDENCE, SUNNYSIDE, PORTLAND, OREGON. This attractive home is built of concrete bricks furnished by The Shope Brick Co., Portland, Oregon, using Medusa Cement. Concrete brick for various structural purposes in the hands of such practical manufacturers as The Shope Brick Co. and firms licensed to use the Shope process, may be regarded as a successful building material.

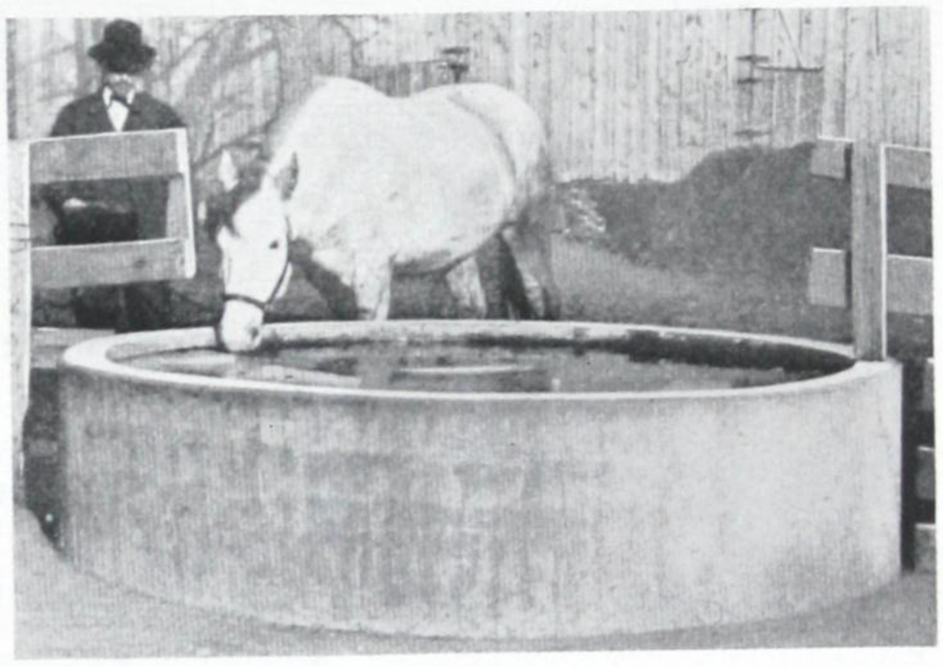
An Excellent Example of the Qualities of Medusa Waterproofing

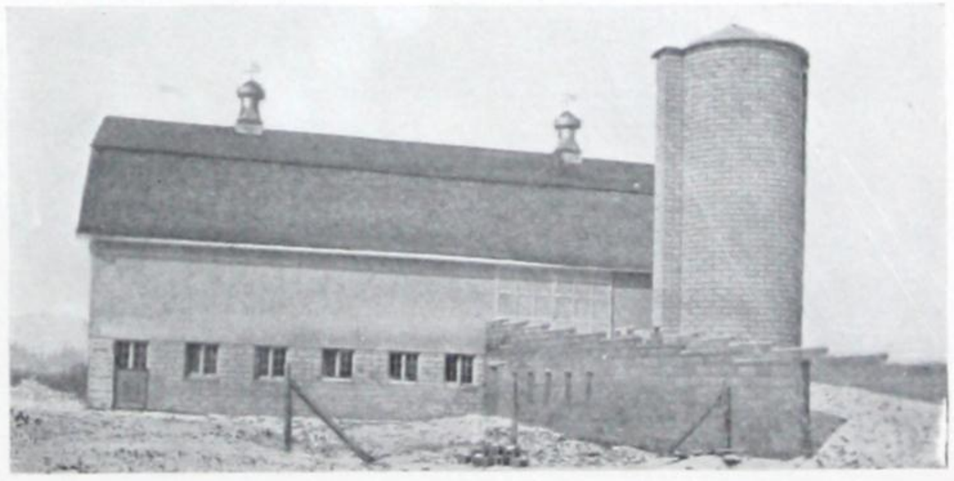
THE McGreevy & Ortman Co., Dayton, Ohio, large dealers in building supplies, are also vigorous boosters for "Medusa." Not long ago we received from Mr. Wm. H. Ortman, President and Treasurer, the above photograph, accompanied by a letter so complete and interesting that it makes up a whole advertisement in itself. We are sure you will agree as you read:

> "I have mailed you under separate cover a photograph of my cement block house built in 1908. I wish to say that this house was built of Medusa Cement, with Medusa Waterproofing Compound used in the face of the block. The blocks were hand made, and built on the same lot where the house now stands.
>
> "My experience in 1913 when Dayton was under flood, has convinced me that this house is as near weather proof as any house can be. This house was plastered direct on the block and no sign of moisture has ever appeared on the walls—due to the Waterproofing Compound used in the cement and mortar. *To prove that this house has been free from moisture, we have some of the first paper decorations in fine condition, free from any stains or weather marks.*
>
> "I can say that this house has fully met my requirements. I believe it has saved me many a dollar in paint and coal bills, and I am pleased to offer the letter to you to use as you see fit, for Medusa Waterproofing Compound is surely the last word when it comes to weather proofing your home."

Making concrete blocks waterproof is a simple matter, adding but a trifle to the cost of each block. Some manufacturers use Medusa Waterproofed Cement for the entire block; others use it on the face only. Firms located at a distance from our mills, where freight rates would be a hardship, can get equal results by adding the correct amount of Medusa Waterproofing Powder to any standard Portland cement while mixing.

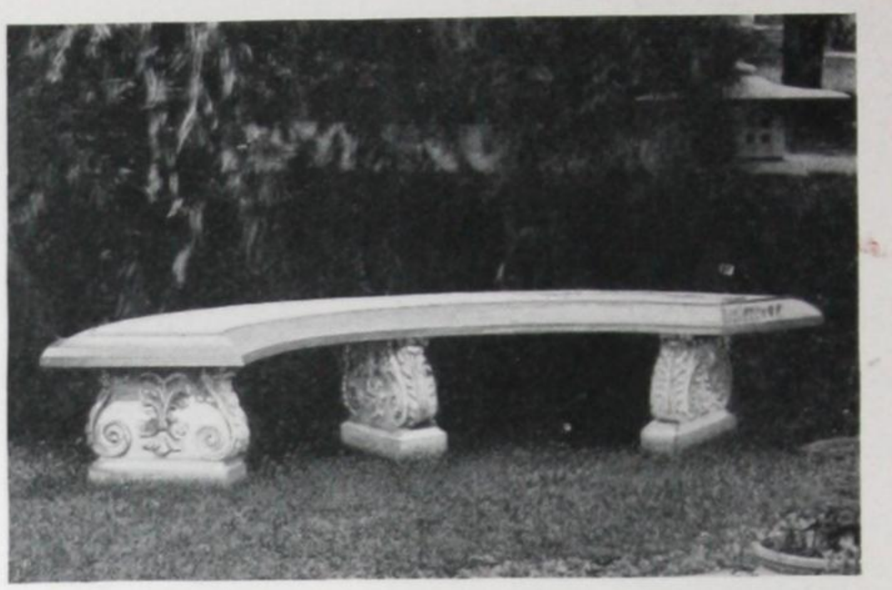
To assure a completely damp-proof effect in the finished building, the block should be laid up in mortar containing a suitable amount of Medusa Waterproofing.

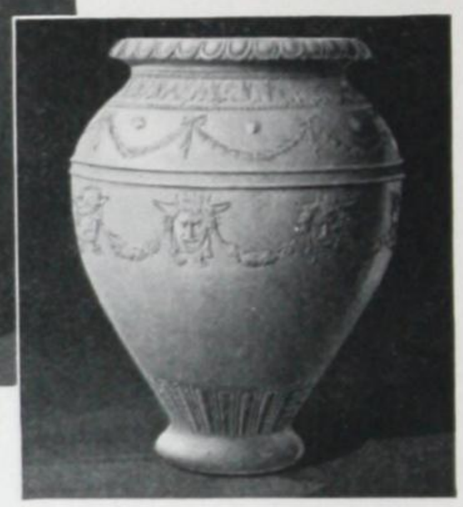




Use Medusa Waterproofing on all Types of Concrete Work for the Farm

Concrete work on the farm, as pictured above, takes on a new and added value when you use Medusa Waterproofing. In silos, milk houses, tanks, etc., you can get an absolutely water-tight construction that puts the final stamp of approval on buildings of this type. If you are interested in farms and farm buildings we have a special bulletin telling all about the various applications of Medusa Waterproofed concrete about the farm. We shall be pleased to send you a copy containing complete specifications and other information.





For Facing Cast Stone

Medusa Waterproofed White Cement is the ideal material for facing cast stone work of all kinds. Fountains, garden furniture, urns, sun dials, pre-cast building trim, etc., are all made with a smooth white facing of Medusa. The very fact that the finished product is really white adds to its beauty. Then, too, where a delicate color shade is desired Medusa Waterproofed White Cement does not spoil the effect with a gray cast.

SECTION VII

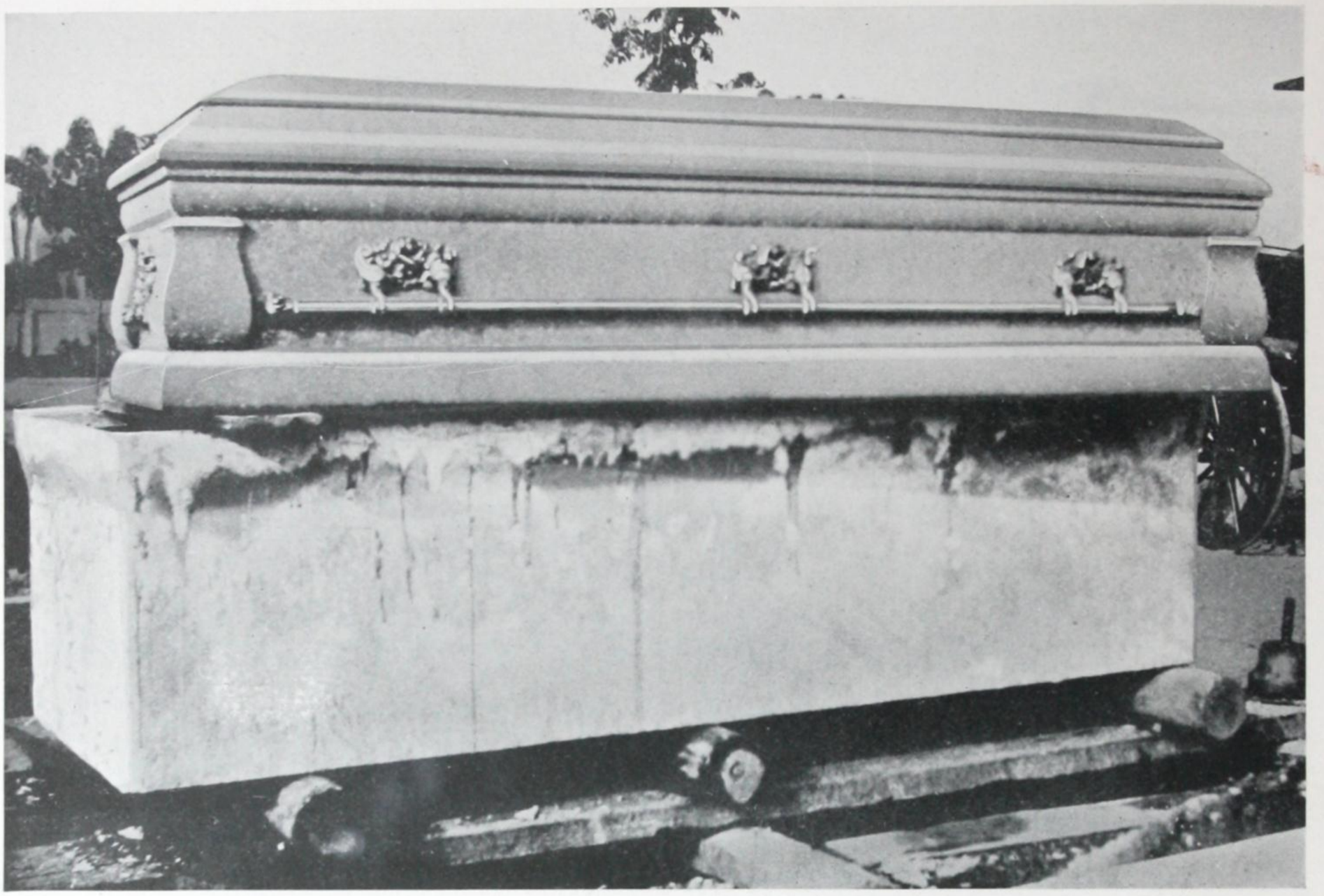
Concrete Burial Vaults
Made with
Medusa Waterproofed Cement
or Containing
Medusa Integral Waterproofing

WITHIN recent years, a number of Burial Vaults have been brought out, designed to keep casket and contents permanently dry. These have reflected great credit upon the designers and have entitled them to real respect as constructive inventors.

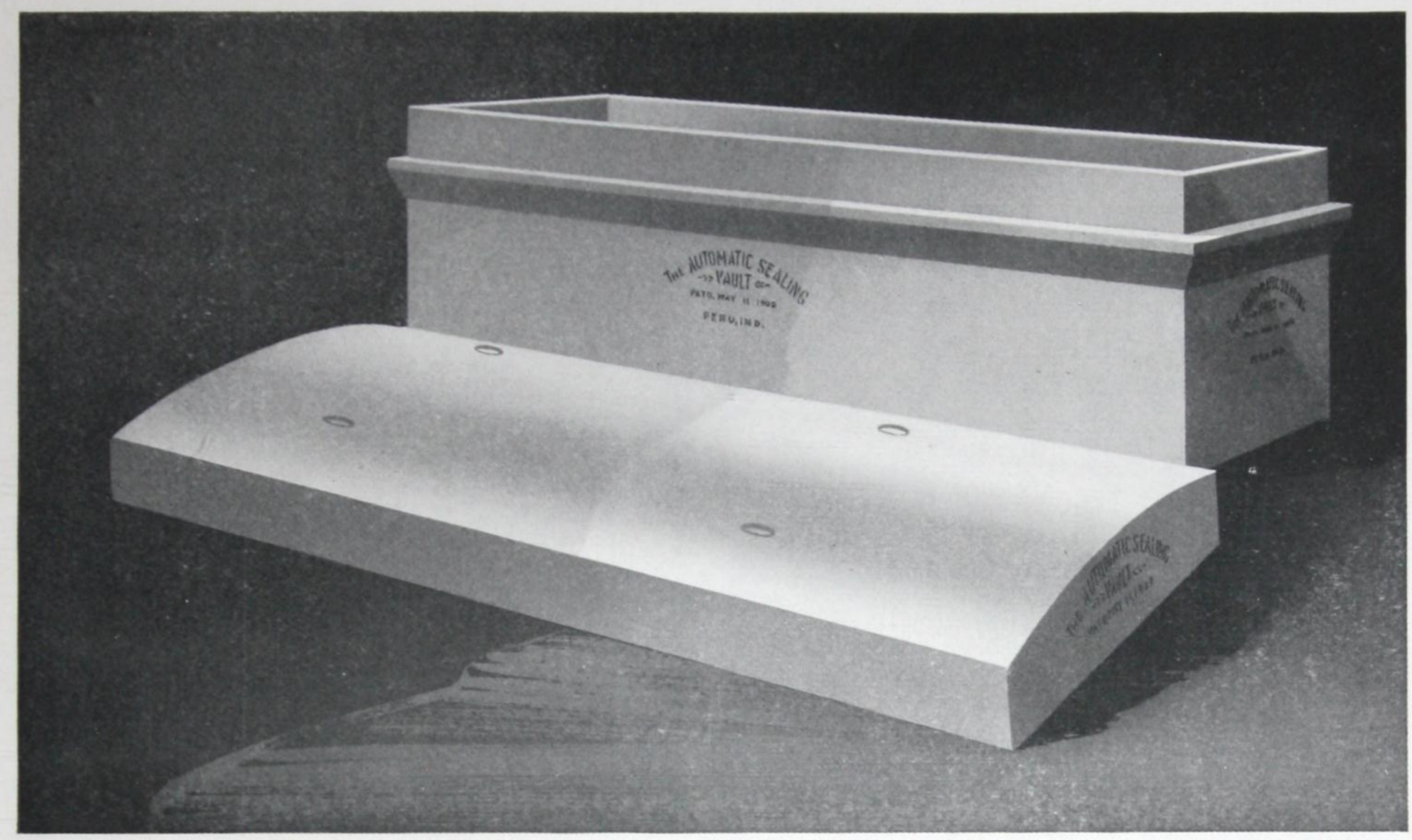
But with the design and the principle of the Vault perfected, it remained for Medusa Waterproofing to complete the work by enabling it to repel water permanently—a very important matter, because the soil of most cemeteries contains an excess of water during a large part of the year, if not all.

Concrete Burial Vaults made with Medusa Waterproofing *do* keep dry, as the letters on the following pages will show. Some of the results quoted there will seem remarkable to those who are learning of Medusa Waterproofing for the first time; but each instance, as the facts are verified, simply adds another link to the chain of evidence in favor of "Medusa."

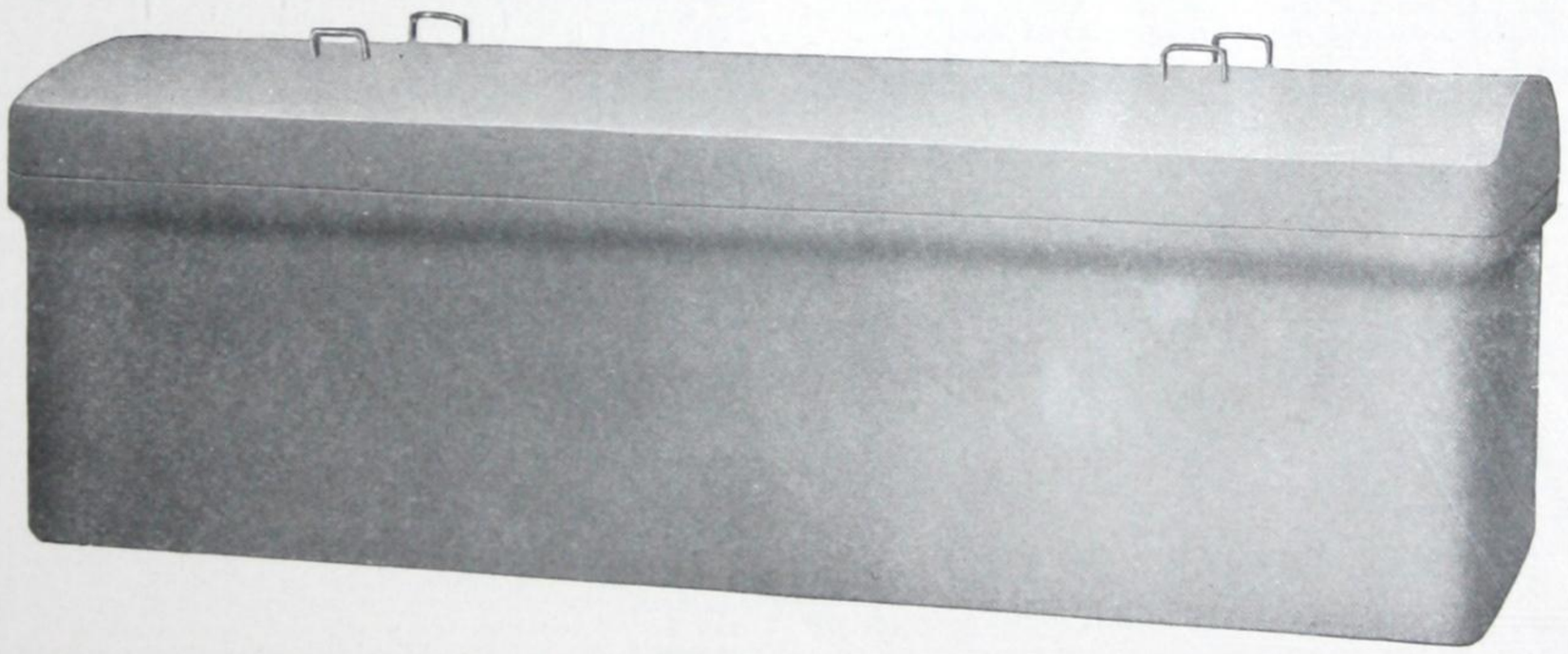
Illustrated on the following pages are various types of Burial Vaults offered by firms who license their use to local manufacturers. These firms, and many others all over the United States, include Medusa Waterproofing as a part of their standard specifications, and emphasize the importance of using it exactly according to directions, if the best results are to be obtained.



The Norwalk Vault Company owns patents covering the design of the very successful concrete burial vault shown above. In its own immediate territory the Company manufactures vaults and sells them direct. It also licenses some three hundred manufacturers of vaults, selling them the moulds. Every Norwalk Contract calls for the use of Medusa Integral Waterproofing to be added to the mix before the form is poured. Norwalk Vaults remain dry inside because of the greater water-repellency the Medusa Waterproofing exerts, overcoming the natural tendency of all concrete to absorb water by capillary attraction.



The Badger Concrete Company, Oshkosh, Wisc., uses Medusa Waterproofed Gray Cement exclusively in the manufacture of the burial vault shown above. Mr. Edgar E. Olsen, writing for the Company, states that many tests prove the concrete to be absolutely waterproof.



The Perfected Burial Vault Co., St. Paul, Minn., makes the vault shown above. There are three separat locking spaces for sealing material. Perfected Burial Vaults are made of Medusa Waterproofed Cement.

Letters About Concrete Vaults Made With Medusa Waterproofing

Norfolk, Va., April 1st, 1921.

On April 27th, 1920, we put a No. 3 Vault in Oak Grove Cemetery, Portsmouth, Va., for one of our local undertakers. The section of the cemetery where this vault was placed was very low and damp, being right on the edge of a creek. The vault was covered with water twice daily on account of being buried below high tide level.

On December 3rd, 1920, we were engaged to disinter the body for shipment to another city. Our men had considerable trouble in trying to remove the dirt from around this vault, on account of water rising as fast as they would remove the dirt. When the dirt was finally removed, water was standing on all sides and six inches on top of vault. The vault was then raised from its watery grave and the top broken off with chisels and sledge hammers.

To the surprise of several skeptical onlookers the vault and contents were found perfectly dry. The casket and contents were in a state of perfect preservation, not even the slightest dampness could be detected.

This is just another proof that Norwalk Concrete Burial Vaults are impervious to all the elements.

Yours very respectfully,

J. U. ADDENBROOK'S SONS, Inc.

By Robert M. Darden.

Moline, Ill., Apr. 26th, 1921.

I take it with pride to inform you that the people of Moline and vicinity two years ago buried the idea of using steel or metallic Burial Vaults. For what reason? because they have been shown and convinced that their Enemy Rust was watering their sealed up relations.

It has been proven on several occasions that a cement vault made right is absolutely watertight. In nine years three vaults have been taken up and moved from ground where water occasionally goes over the top, but was found to be for what it was bought, it had kept the water out and the public around here knows it.

When a cement vault is made by a dependable mechanic using the right proportions of good material and made in a National Vault Mould, which is the only mould that can offer the buyer an absolute one-piece vault, because after it has been sealed right it is absolutely watertight.

Yours truly,

CARL G. JOHNSON.

April 16, 1921.

The making of Concrete Burial Vaults has been the main factor of our business for twelve years and our experience in their manufacture and handling has been tried and tested. We are in a position therefore, to give you a few examples of our experience with vault disinterment.

During the month of May, 1918, we disinterred a vault that had been in moist ground since December, 1911. Upon extracting the cover we found the remains to be intact, and the vault absolutely dry and free from moisture, having been in the ground nearly eight years.

In the year 1918 we used one of our small vaults for a family who interred a cremated body, and since that time we have disinterred and opened the vault three times for similar burials, so that to date there are four receptacles of ashes in the vault. Each time of removing the cover we found it to be absolutely dry, and a plush cloth placed in the bottom for trimming was as bright in color as the day of the first interment.

We could mention several other instances of the removing and transferring of vaults, but the above examples prove to us without any doubt whatever, of the absolute stability and preserving qualities of our product.

Very truly yours,

WILLBEE-MORSE CONCRETE CO.,

C. H. WILLBEE,

Pres.

CHW-W

I have taken up several Vaults, and have never found one that had a fault, or showed the least sign of leak or check.

I have placed them in graves where there was enough water to float them, and found them the following morning in a perfectly dry condition.

I placed one in St. Mary's Cemetery, Bloomington, Ill., that was shipped from Iowa City, Iowa, which had been buried for a year or more. There was no sign of leak or check. This Vault was shipped about three hundred miles by express.

Enclosed find a kodak picture of one I disinterred, which was in the ground about ten months. When first interred it was in about ten inches of water. You can see the tarred paper sticking to the vault we placed over sealing to keep the dirt out of the fresh cement. It was perfectly dry. No checks or cracks. No signs of leaking.

Yours very truly,

FRANK H. PETRIE, Owner.

THE NORWALK VAULT CO.,

Bloomington, Illinois.

Campaign, Illinois,

April 22, 1921.

It is somewhat unusual to write of past experiences in the Vault Business. We have had to make a number of removals. Found them in first-class condition in all respects.

Ten years ago one of the superintendents of a local cemetery was our biggest knocker. For two years he did all he could against us, then one day we placed a vault and within 30 days same was removed to another part of the cemetery. He made the remark that he would crush the vault, so placed a log chain near the center and with one hoist raised same without any trouble. Judge vault was 70 days old. One of our busiest undertakers who happened to be in the cemetery and a witness to the demonstration, said: "Well, you must now change your mind, for if you can do such things as that with a vault what more could you expect." From then on he has been a booster with encouraging words for the Norwalk Vault made by Lange Brothers.

We have more confidence in the Norwalk Vault since we are using the Universal Concrete Machinery's jigging machine. We use just a little more material which leaves the vaults in a glossy stage. Paint holds good and seal is perfect with the Slaters felt over fresh cement seal for protection from earth being placed on vault.

Yours very truly,

LANGE BROTHERS,

H. E. Lange.

Evansville, Ind.,

March 10, 1921.

In response to your inquiry of March 2d, to give you our experience if we had had any, in reference to the durability and waterproof qualities of the Norwalk Vault.

About a year since, we had occasion, due to some legal question, to open up a vault which had been interred for a considerable time, in order that the corpse might be examined. We found the seal was hard; that it took two men two hours to cut it sufficiently, so that the lid could be taken off, and when opened we found same absolutely dry. There had been no seepage and there was no sweat, and the flowers that had been dropped in the vault on the casket were wilted but still intact.

On another occasion we had two vaults that had been buried about a year in the wettest part of one of our cemeteries, which were removed. The Superintendent of the cemetery made a special effort to find whether any leakage had taken place, by tilting the vault into different positions to ascertain whether any seepage or water had gotten into the vault, and it was pronounced free of water and dry. This test was made by the cemetery people.

We have filled vaults before use, with water, to test them. We have submerged them, and at no time have we ever found a vault that we made, to show any leakage whatsoever; in fact we have found them absolutely impervious to water.

Hoping this information will be of service to you, I beg to remain,

Very truly yours,

CJS-CL

CHAS. J. SCOLZ.

Fond du Lac, Wisconsin,

April 1st, 1921.

We purchased moulds and territory rights from your company in 1909 and since that time have continuously manufactured and sold the Norwalk Vault. During these twelve years our experiences in the vault game have been many and varied. But each case has convinced us beyond a question of doubt, that the Norwalk Vault is positively damp and waterproof (if properly made), and as those vaults that were buried the longest were the hardest, would seem conclusive proof that the Norwalk Cement Vault might safely be classed as everlasting. Following are a few cases that will substantiate our statements:

(1) A Bishop of the Episcopal Church was buried Sept. 3, 1912, in a cement vault at Rianzi Cemetery. Vault and body disinterred the vault was opened Sept. 2, 1913, and the body was found in a perfect state of preservation. Vault perfectly dry inside. Body was removed to the St. Paul's Cathedral where the remains were viewed by hundreds for a period of days. The body was then placed in a crypt under the St. Paul's Cathedral.

(2) A prominent business man of our city died in Florida. The remains were inclosed in a double case bronze casket, which was inclosed in a steel vault. Shipped to Fond du Lac and buried in Calvary Cemetery in May, 1918. Due to our advertising which stated that the steel vault is not waterproof, the relatives concluded to have this body exhumed, which we did, on Nov. 30, 1918, in the presence of eight or ten witnesses. We found the steel vault full of water within four inches of the top. And this after only six months of burial during the dry season. We removed the casket from the steel vault, let it drain for four hours and placed it in one of our cement vaults and sealed it. We then buried body in vault in the same grave that the steel vault came out of. This on Nov. 30, 1918. In Sept., 1919, we again exhumed this body, chiselled the seal of the vault, and found when opened that the vault was perfectly dry and casket in perfect condition. This also was witnessed by eight or ten persons. The casket and body were them placed in the family Mausoleum (which was just completed).

(3) W. W. Clark, a prominent business man of our city, was buried June 27, 1916, in one of our vaults. Vault and body exhumed June, 1917, body removed from vault and placed in family tomb. Body found in perfect state of preservation and vault perfectly dry.

(4) Sister Hobert was buried in Rianzi Cemetery, Dec. 24, 1917, in one of our vaults. This vault was disinterred May 6, 1919. Vault found in perfect condition, was placed on a small spring wagon and hauled to a new section of Rianzi Cemetery and buried again.

(5) Daughter of our banker, buried in vault at Rianzi, Jan. 24, 1916. Vault exhumed Nov. 18, 1916, and removed to a new section of the Cemetery and reinterred, found in perfect condition.

(6) An ex-railroad conductor was buried in a vault at Rianzi Cemetery, Sept. 13, 1919, and was exhumed Nov. 19, 1919. The vault was opened and found perfectly dry, and body found in as perfect a condition as on date of burial. Vault resealed and reinterred in the same grave. P. S.—This body was exhumed because by an oversight a quantity of money was buried with the body in a secret pocket of an artificial limb.

(7) Viola, a daughter of the District Superintendent of the Evangelical Conference, was buried in one of our vaults, March 23, 1916, at Rianzi Cemetery. Another daughter, buried in a vault Jan. 8, 1917, in the same family lot. These burials were in a very low and wet section of the cemetery. Both were disinterred, April 19, 1920. The water was eight inches over the top of the vaults at the time. Both vaults were in perfect condition. We scrubbed the mud from the outside of the vaults, placed them side by side on an auto truck and delivered them to the Forest Home Cemetery, at Milwaukee, a distance of seventy miles, where reinterment took place. These vaults were not opened, but if there had been any water inside we would have been able to detect it. The weight was no more than on day of burial.

(8) E. L. Rottman, a soldier, buried in one of our vaults at Rianzi Cemteery, Oct. 17, 1918. The vault was exhumed April 24, 1919, and found in perfect condition. Reinterment took place in a new plat in the same cemetery.

(9) M. McCabe, buried in one of our vaults, Nov. 8, 1913, at St. Charles Cemetery, Taycheedah. This vault was exhumed June 20, 1914. Vault and body removed to Calvary Cemetery, Fond du Lac, where body and vault was reinterred. Vault found in perfect condition.

We could mention from six to ten more disinterments of our vaults that were buried from one to six months and found in perfect condition, but I only intended to give a few illustrations to prove my statements, which I think I have done to your satisfaction.

I remain, Very truly yours,

FOND DU LAC & WINNEBAGO VAULT CO.,

C. F. Procknow, Prop.

Fond du Lac, Wis.

Mt. Vernon, Ohio, April 23, 1921.

For fourteen years, I have been giving to the National Vault the real test that actually reveals the true quality of any commodity; which is, namely, the task of accomplishing the purpose for which it is designed. During this experience in no single instance has the National Vault fallen below its high standard of quality or failed to do all that has been claimed for it.

This splendid record is especially true in regard to durability and dryness, as the following case shows. In August, 1909, I placed a National Vault in a muddy grave in a small country cemetery near Mt. Vernon. After being properly sealed in the ordinary manner, the vault was left in the wet ground for nine years, until 1918, when it was disinterred and removed to Mt. Vernon.

The enclosed picture shows the condition of this vault after its removal from the grave. Both inside and out it proved to be in excellent condition. The interior was perfectly dry and the contents had been preserved in a manner that was really remarkable. The lid of the vault had also become so completely joined that it was practically one piece with the body, and the whole vault was impervious to foreign substances and as thoroughly waterproof as the day it was lowered into the grave.

Disinterment of National Vaults proves conclusively that regardless of the condition of the grave, the vault always maintains a thoroughly dry condition inside. The contents are preserved in a condition superior to any other receptacle for the burial of the dead. Disinterment establishes the qualities of durability beyond any question and proves that the longer the vault is allowed to remain in the ground the harder and more impenetrable it becomes. Furthermore, the lid of the vault itself as a result of the sealing process used actually becomes a part of the body as compeltely jointed as though it were constructed so originally.

Very respectfully yours,

W. H. WEST.

Lakeland, Fla., April 22nd, 1921.

We have been using the moulds purchased from your company a little over eight years, and consider them the best on the market.

In these eight years we have disintermented four bodies to be shipped north, one was buried 17 months and 23 days and when taken out of the vault the casket was in perfect condition, not even soiled or mildewed. Upon examining the body we found it in perfect condition.

The other three were buried from three to six months and were in perfect condition.

We consider that there is nothing better made to lay away our loved ones than to use one of our vaults.

An interview with our undertakers, Gentry Futch Co., stated that since we handle your vaults we have only put one brick vault and no steel vaults at all and we believe that the cement vault is by far the best vault made. Yours truly,

FLORIDA NATIONAL VAULT COMPANY,

By H. B. Zimmerman.

Fond du Lac, Wis., Nov. 14, 1921.

Lieut. J. M. Rodig, buried in a Norwalk Cement Vault at Rianzi Cemetery, February 20, 1918. This vault disinterred October 29, 1919. Vault found in perfect condition—dry as a bone—after 20 months' burial. Was loaded on a truck and delivered to new plat and reinterred.

P. S.—You will observe yours truly standing on the vault.

Mr. R. Haas, a dry goods merchant of our city, buried in a Cement Vault at Rianzi Cemetery, January 23, 1920. This was a No. 6 vault. This vault was disinterred May 6, 1921. Vault loaded on auto truck and delivered to new section of cemetery and reinterred. Vault in first-class condition after 15½ months' burial.

P. S.—Kodak picture shows method of raising vault out of ground.

Very truly yours,

FOND DU LAC & WINNEBAGO VAULT CO.,

Per C. F. Procknow, Prop.

Fond du Lac., Wis., Nov. 14, 1921.

On May 8, 1918, we buried the remains of Miss Catherine Heath in a Norwalk Cement Vault at Rianzi Cemetery. This vault was exhumed June 3, 1921. Vault found in perfect condition and perfectly dry after being buried 37 months in a very wet grave. This vault was loaded on our truck and delivered to a new section of the cemetery, about one-quarter of a mile distant, where reinterment took place.

Enclosed kodak picture will show the vault after disinterment.

Very truly yours,

FOND DU LAC & WINNEBAGO VAULT CO.,

Per C. F. Procknow, Prop.

Good Words From Users of Medusa Waterproofing

I take pleasure in assuring you that Medusa Waterproofing was used with excellent results on an apartment house here in Washington, waterproofing walls below the ground level and elevator pent house.

JOS. J. MOEBS,
Consulting Engineer, Washington, D. C.

Wheeling, W. Va., April 17, 1918.

Relative to National Bank of W. Va., I beg to advise that Medusa Waterproofing was used in basement walls and floors for making them impervious to water, as the building is in the flood district and will be subjected to flood pressure at least once a year. I have every reason to believe that it will be satisfactory, as I employed the same method and used Medusa Waterproofing in the basement of an eight-story reinforced concrete warehouse for the W. A. Wilson & Sons in this city, which has successfully withstood floods for three years, and in the basement of the twelve-story Windsor Hotel, this city.

CHARLES W. BATES,
Architect and Structural Engineer.

Pittsburgh, Pa., April 20, 1918.

We built the Dilworth School and used considerable Medusa Waterproofing to keep the moisture from the metal reinforcement. We used the material in accordance with your instructions and found it very satisfactory.

DAWSON CONSTRUCTION COMPANY.

In the building for The Combined Locks Paper Company, Combined Locks, Wis., I used Medusa Waterproofing for floors, machine pits, scale pits, elevator pits and in some instances in connecting new work to the old, and in all cases your material was more than satisfactory and the results were excellent. It is not necessary for me to make any statements about this work as it shows for itself just what it is. I will further state that I have been a user of compounds for concrete for a number of years and I can prove by my past work that Medusa waterproofing is, first, last and always, the most economical of all. I will be willing at any time to furnish further information to anyone needing it, or will take over any waterproofing problems and guarantee the results.

HARRY LaFAYETTE, Construction Engineer.

Springfield, Mass., May 19, 1923.

When in need of waterproofing I always use Medusa, as it has not failed me yet.

Very truly yours,
CHARLES H. CRANDALL, Architect.

Montgomery, Ala., January 25, 1923.

I wish to tell you about an experience I had several years ago with Medusa Waterproofing.

I completed a concrete grain elevator in Montgomery for the Hobbie Grain and Milling Company. Later leaks developed on the north-western bins and on the north walls of the work house. In rain storms, accompanied by high winds, the water seemed to drive right through the concrete walls, up about the top of the bins or about eighty-five feet in the air.

I finally determined to experiment with a wash of "Medusa Waterproofed Cement," putting on a brush coat. I am glad to say it did the work very successfully, and up until the present those bins have been as dry as the proverbial powder house should be.

I have had very good success with Medusa Waterproofed Cements in foundation work, and swimming pools. In fact I have always found all of the Medusa products excellent.

Yours very truly,
J. W. MARTIN, Contractor.

Somerville, N. J., February 24, 1923.

****Four houses of which foundations were waterproofed with "Medusa" in 1913, have been perfectly satisfactory ever since, in spite of the fact that they were built where there was an actual flow of water in the shale where cellars were dug.

P. C. VAN NUYS, Architect.

St. Louis, Mo., January 31, 1923.

We used Medusa Waterproofing in the foundation walls of the Missouri Baptist Sanitarium. From all indications this material has proven very satisfactory. The job has been completed for several years.

Respectfully,
MURCH BROS. CONSTRUCTION CO.
Geo. H. Murch, Treas.

Roselle, Ill., December 14, 1921.

We had a leak in our elevator pit, and every morning we had to dip the water out before starting business. We tried every conceivable way to stop it, but to no avail, until your salesman called on us and told us about Medusa Waterproofing.

We used it as directed and we are more than pleased with the results. We can strike a match on the floor of the pit.

We cannot say enough in praise of Medusa Waterproofing as the leak was a bad one and caused us a great deal of annoyance as well as expense.

Very truly yours,
ROSELLE FARMERS CO-OP. ELEVATOR CO.

Grass Valley, Calif., March 11, 1923.

One year and a half ago I used Medusa Waterproofing in the cement plastering with which I lined a corroded and leaky 5,000 gallon galvanized iron tank. Up to the present time it is dry and substantial.

Very truly,
E. S. MATTESON.

Moline, Ill., November 1, 1921.

We used Medusa Waterproofing in the basement walls of the Moline Trust and Savings Bank, this city. All stone work was set with Medusa White Cement.

Yours very truly,
BEDER WOOD'S SONS COMPANY.

Sharpsville, Pa., October 25, 1921.

With the passing of another season, after examining the Pits which we have in use at our plant, we find that the Medusa Waterproofing in the concrete is still intact. We believe Medusa to be very efficient when properly applied.

C. E. SWAB, Chief Engineer,
Valley Mould & Iron Company.

Oglesby, Ill., March 11, 1921.

The Waterproofing Paste I bought from you last Spring I used in a garage built of concrete blocks. One side and end was four feet below ground.

I used the Paste outside to grade level and inside to full height. I met the owner about a month ago and asked him if he had any dampness inside; his answer "none whatever—dry as a bone."

JAMES ORR.

Columbus, Ohio, January 29, 1923.

In the Empress Theatre Building erected in the summer of 1915 I used all Medusa Cements and Medusa Waterproofing. The boiler room is 18 feet below curb level and 8 feet below city sewers. Built in water bearing soil of Medusa Waterproofed Cement it is still in perfect condition. Pipe tunnels and underground heating ducts of galvanized iron, with a 6" jacket of Medusa Waterproofing do not leak a drop of water though buried in wet ground.

HARRY E. HOLBROOK, Architect.

New York City, February 12, 1923.

The Natatorium in Pittsburgh in which I used Medusa Waterproofing in 1904 has always been absolutely waterproof. There has been no deterioration.

A similar method of construction, using Medusa Waterproofing was applied in the swimming pool built at Eastbury, L. I., for Mr. Phipps.

F. A. BURDETT.

Freeport, Minn., February 25, 1923.

I used Medusa Waterproofing 5 years ago on a basement job in this town. Today it is still dry and shows no signs of deterioration.

HOESCHIN'S CEMENT WORKS,
F. J. Hoeschin, Prop.

New York City, March 5, 1923.

Medusa Waterproofing is frequently specified by me and I believe with generally uniform and satisfactory results.

In the construction of the Farm Buildings for Arthur Curtiss James, Esq., at Newport, R. I., some years ago a considerable quantity of Medusa Waterproofing was used. The results were very gratifying.

GROSVENOR ATTERBURY, Architect.

Walla Walla, Wash., April 2, 1923.

We have used lots of Medusa Waterproofing Compound. One job in particular, where the climate is wet and water was running through the concrete walls of a basement in Bellingham, Wash. We took a contract to waterproof it, no cure, no pay. We applied a cement plaster coat mixed with Medusa Waterproofing to inside walls of the basement. The results were very fine,—a dry basement and a pleased customer.

WALLACE BROTHERS.

Providence, R. I., April 28, 1918.

I have used Medusa Waterproofing in all the reinforced concrete for the Disposal Plant and the Pumping Stations at Warren, R. I., with very satisfactory results. The tanks and pumping stations are located near the water's edge and some twelve feet below high tide. The ground is marshy and wet, but the walls have proven to be dry and impervious to moisture as the result of using Medusa Waterproofing.

CHARLES F. CHASE, Consulting Engineer.

Celina, Ohio, June 19, 1916.

Referring to yours of the 17th inst., with reference to the 50 barrels of Medusa Waterproofed Gray Cement that we purchased during 1915, will say that the same was used in a sewage disposal plant here in the city and proved very satisfactory.

Yours very truly,
THE P. KUNTZ & HERR LUMBER CO.

THE BEST WATERPROOFED CEMENT THAT CAN BE USED

Tipton, Ind., Sept. 17, 1916.

I have used several barrels of your Medusa Waterproofed Cement, both Gray and White, in block and basement work. I find it the best material I can use for a strictly waterproofed job.

Yours very truly,
TIPTON CEMENT WORKS,
T. D. Foster, Proprietor.

Abingdon, Ill., July 1, 1916.

The car of Medusa Waterproofed Gray Portland Cement purchased from you last year was used in the new Congregational Church this city, in construction of the basement. It has given good satisfaction and the committee is well pleased.

Yours very truly,
F. L. TORRANCE.

Fond du Lac, Wis., Oct. 21, 1916.

We have used your Medusa Waterproofed Cement on a number of basements and it has proved satisfactory. We will certainly use more of it in the future.

Respectfully yours,
ROSENBAUM CONSTRUCTION CO.
(General Contractors.)

Oconto, Wis., Sept. 20, 1916.

We beg to advise that wherever we used your Medusa Waterproofed Gray Portland Cement it has always given good results. We have faced cement blocks with it and they are the best blocks we have ever seen.

We are going to use about 50 barrels Medusa Waterproofed Cement in the construction of a floor within the next few days.

Very truly yours,
JAS. A. URQUHART.

Vickery, Ohio, Aug. 30, 1916.

We sold your Medusa Waterproofed Cement to Mr. Allen Coonrod, of this place, to be used in putting in the walls of his cellar under the residence he recently built here.

We are only a short distance from the bay and a hole dug will immediately fill up with water and remain so the most of the year.

Mr. Coonrod dug his cellar the size of his house and the usual depth, and tells us he has never had a drop of water in it and enjoys all the luxuries of a well drained cellar through the use of the above named cement.

Considering the conditions as stated we think this is remarkable.

Yours truly,
THE VICKERY GRAIN CO.

250-GALLON GASOLINE TANK BASIN WATERPROOFED

Vickery, Ohio, June 19, 1916.

We used Medusa Waterproofed Gray Portland Cement in putting in a basin to hold a 250-gallon gasoline tank. This from necessity had to be buried in a low wet place under the elevator.

The man who put this in assured us he could make this basin waterproof by using Medusa Waterproofed Cement. We were very skeptical, and against our best judgment we let him put it in.

All this spring the water has been standing all around this basin and a part of the time nearly over the top, but the inside is perfectly dry. We are glad to recommend your product.

Yours very truly,
THE VICKERY GRAIN COMPANY.

East Alton, Ill., April 16, 1918.

We note you desire some information regarding the condition of the shot tower well which we put in, using Medusa for waterproofing purposes. The work is in the same condition as when it was finished and has not given us any trouble whatever since the completion. We do not see but that the result is practically as perfect as is possible, as there is no water passing through the concrete walls which are submerged for a depth of something like forty feet.

EQUITABLE POWDER MFG. CO.,
F. W. Olin, President.

Sycamore, Ill., July 3, 1918.

We have sold and used Medusa Waterproofing personally for a great many years, and have always found it satisfactory. We have used this in cellar walls, for relining cellar walls and for elevator boots and general foundation work, with great satisfaction and it always produced the desired result if used correctly; in fact, we have never found anything else that was satisfactory.

HOLCOMB BROS.

Lincoln, Ill.

We have been using Medusa Waterproofing in our work for several years and find it to be all you claim for it. It certainly is what its name implies—waterproof.

SHOUP & JONES.

Lodi, Ohio, March 15, 1923.

The Medusa Waterproofed Cement we purchased from you last year was used in the construction of a grain storage for the Lodi Equity Company, at Lodi, Ohio.

It is a four tank storage of 10,000 bu. capacity, built of 8″ concrete blocks made of Medusa Waterproofed Cement. Steel reinforcing was laid between each course of blocks and then the cores in the blocks were poured full of waterproofed grout, thereby making a solid reinforced construction.

These bins are perfectly dry and the elevator pit which is about 10 feet below the surface of the ground is absolutely waterproof although the water nearly filled the excavation before it was concreted.

We figure that Medusa Waterproofed Cements are a great saving on the job as there is no trouble to mix it and no worrying about someone forgetting to put in the waterproofing.

Assuring you of our confidence in Medusa Waterproofing after several years use, we remain,

LODI CONCRETE WORKS.

Galesburg, Ill., March 15, 1918.

In reference to waterproofing used in the High School Gymnasium, this city, will say that the architect did not specify Medusa Waterproofing, but since we had to guarantee the work, we took the liberty of using it as we knew, absolutely, that this material would be good. Medusa Waterproofing was used as per the manufacturer's specifications, integrally with the concrete, in both of the swimming pools, and the result is very satisfactory.

MONMOUTH-GALESBURG CONSTRUCTION CO.

Pittsburgh, Pa.

It gives us pleasure to say that in the construction of our building, Medusa Waterproofing was used in the basement and effectually stopped several springs, which otherwise might have kept our basement damp.

A. R. ELLIS, Assistant General Manager,
Pittsburgh Testing Laboratory.

Beatrice, Nebr., October 23, 1918.

We have handled Medusa Waterproofing for several years past, and wish to say that we have never received any complaint whatsoever regarding the same. Consequently, all you claim for it must certainly be making good. We have sold several tons of it with a steady increase in tonnage every season, and we will continue to handle the same in the future, push it, and advertise it on our monthly price list, together with the help that you are giving us through your various advertising mediums.

THE JOHN H. VON STEEN CO.,
John H. Von Steen, Pres. and Treas.

Ironton, Ohio, August 18, 1905.

We used your Medusa Waterproofing to waterproof a 100,000 gallon concrete tank and found it to be entirely satisfactory, at least the tank has not leaked a drop since we used it in the plaster with which we plastered the tank.

THE IRONTON PORTLAND CEMENT CO.

Ironton, Ohio, May 2, 1918.

In regard to Medusa Waterproofing used by us in concrete tank several years ago, will say that we have had this tank in service now about 13 years, and up to date we have never noticed any leaks whatever. We have been very well satisfied with the result obtained from the use of your Medusa Waterproofing.

THE IRONTON PORTLAND CEMENT CO.

Spencer, Ia.

We built three elevators, the pits of which were 16 feet deep. The walls of these pits are part of the foundation and are 12 to 18 inches thick. Two of these pits under the elevator at Glidden, Iowa, were practically sunk in water; *we had to keep four-inch pump going night and day.*

We plastered the walls of the pits with three coats of Medusa Waterproofed Cement and *they are as dry as a bone.* This also holds true of pits in elevators that we constructed at Somers and Jolley, Iowa.

NELSON-KING CONSTRUCTION CO.,
General Contractors.

Glenwood Springs, Colo.

We used Medusa Waterproofing on a 2000 bushel concrete wheat bin where the water used to run along one corner of the bin. It has been in use now for nearly three months and shows no signs of leaking or dampness.

THE FARMERS' MILLING & POWER CO.

John T. Milliken and Co., Building, St. Louis, Mo. Dimensions of basement 154 x 210.

Mr. William Wedemeyer, St. Louis, Architect, has the following to say of this job:—

"All the basement walls and floor were waterproofed with Medusa Waterproofed Portland Cement and very successful results were obtained. The building was erected on a plat of ground which at one time was a river bed and about 800 concrete piles were driven 30-40 feet long. We had considerable trouble with water during the erection of the building but after waterproofing the basement walls and floor with Medusa Cement we did not have any further trouble, and I will continue using Medusa Waterproofed Portland Cement for any future buildings I may erect."

KELLERMAN CONTRACTING CO.,
St. Louis. General Contractors.

Summary

Medusa Integral Waterproofing

1. Is the original and most concentrated Waterproofing manufactured. It renders concrete or cement plaster damp-proof, waterproof, impervious and non-absorbent.

2. Lubricates the mix and allows placing of concrete with less labor cost.

3. The lubrication permits the various ingredients to settle more compactly, making a denser concrete.

4. Prevents undue expansion or contraction due to alternate wetting and drying of concrete, stucco and cement plaster.

5. Prevents spawling of concrete due to freezing while wet.

6. By rendering concrete impervious, prevents moisture from attacking the steel in reinforcing.

7. Resists sea-water as well as fresh water.

8. Does not affect the time of setting of concrete or cement plaster.

9. Does not affect the strength of the concrete or cement work.

10. Does not affect the color of the concrete or cement work.

Some Things Medusa Waterproofing Will *Not* Do

It will not make good cement out of poor cement.

It will not mature green cement.

It will not properly proportion a concrete mixture.

It will not mix itself with cement upon being simply thrown into contact with it.

It will not make an incompetent superintendent or workman competent.

In short, although Medusa Waterproofing is intended for practical use, the best results should not be expected unless it is used in conjunction with good average material and intelligent supervision and workmanship.

Important Things to Remember About Concrete

1. Use fresh Portland cement. Remove all lumps which cannot be crushed to a powder between the fingers.

2. Test sand for loam and organic matter. Loam and organic matter weaken concrete and reduce its wearing capacity.

3. Use stones ¼ inch to 1 inch in diameter for reinforced work. Larger stones can be used for foundations and similar work. Avoid loam and organic matter, as in sand. Don't use soft, long, thin stones.

4. Don't use too much water. Just enough to secure plastic mixture. Excess water weakens concrete.

5. Proportion materials correctly. Don't guess.

6. Tamp well.

7. Protect from sun and wind.

8. Protect from frost in cold weather; also heat materials in winter.

9. Mix materials thoroughly.

10. Build forms strong and tight.

Medusa Waterproofing is the Original Integral Waterproofing for Concrete

MEDUSA Integral Waterproofing provides a dependable means of rendering all concrete work permanently waterproof and impervious to moisture.

The principle and formulae were first developed successfully by the late Dr. S. B. Newberry, and full protection was granted by the United States Government under the Newberry patent No. 851,247.

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Looking out from the executive offices of The Sandusky Cement Company on the tenth floor of The Engineers' Building in Cleveland, one sees a long, almost unbroken sweep of lake front reaching for miles eastward from Rocky River almost as far as Gordon Park.

Guarding the long sweep of the harbor stands the Cleveland Breakwater—a huge sea-wall of solid concrete, built more than a quarter-century ago, and resisting alike the assault of time and the ceaseless battering of Lake Erie's mighty waves.

It was built in the late 90's, by The Hunkin-Conkey Construction Company of Cleveland. Medusa Cement was used in its construction and furnished by The Cleveland Builders Supply and Brick Company.

In its massive, sturdy lines, silhouetted against the westward sun on a calm evening; or on a day of storm, when in grim strength it shoulders its massive bulk against the booming waves that strive to batter it down, the Cleveland Breakwater seems to speak a message of encouragement to those who labor against great odds—standing through the years a silent but eloquent exponent of the gospel of faithful service.

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